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THE MICRO USER

Volume 4
Number 8
October 1986
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Compact software: First of the flood

EDUCATION MICRO USER

Econet: More trouble than it's really worth?

BUSINESS MICRO USER

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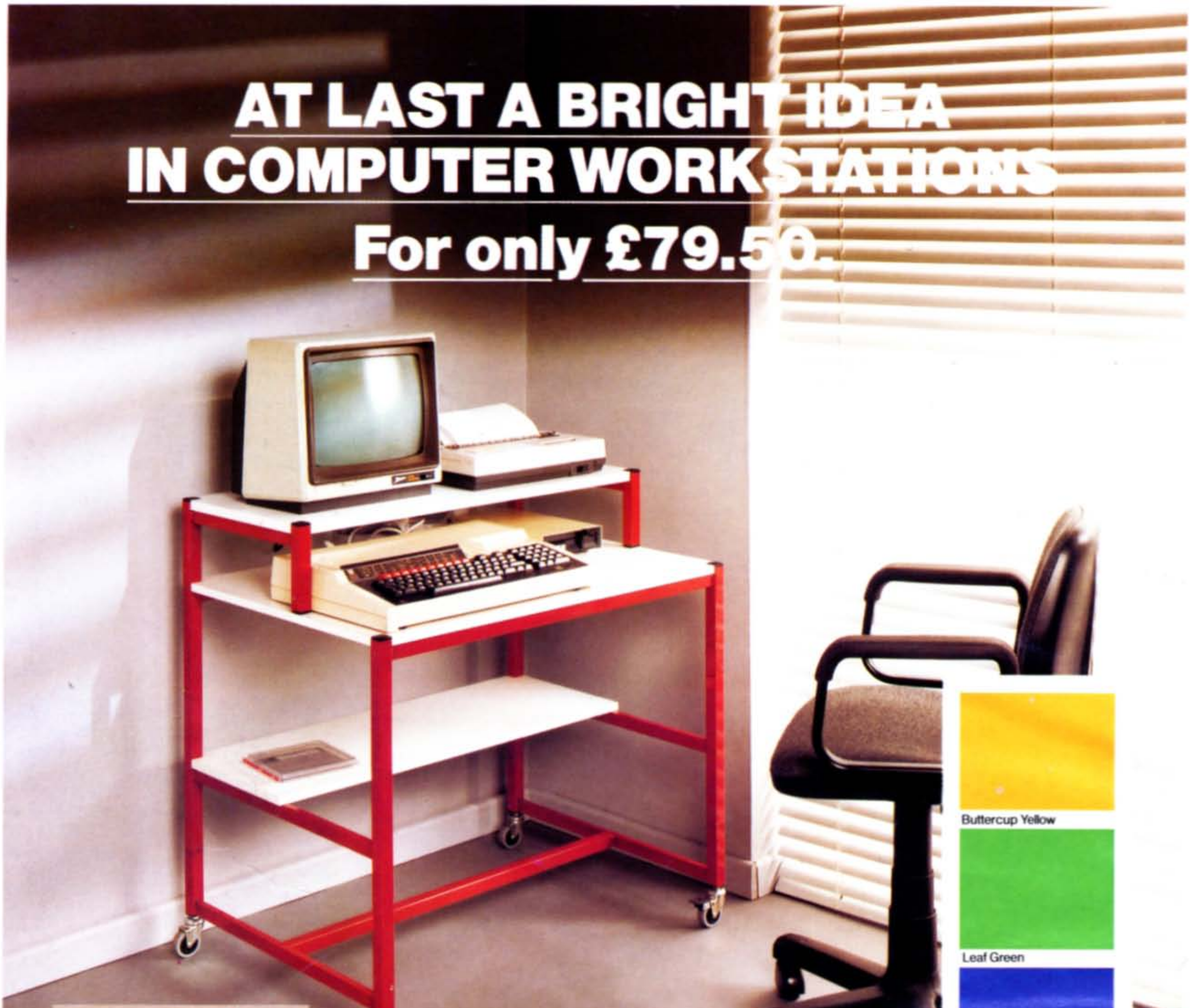

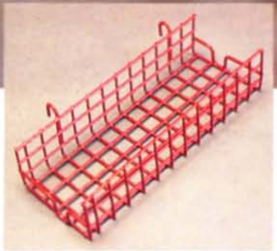

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Save vital memory with our text compressor
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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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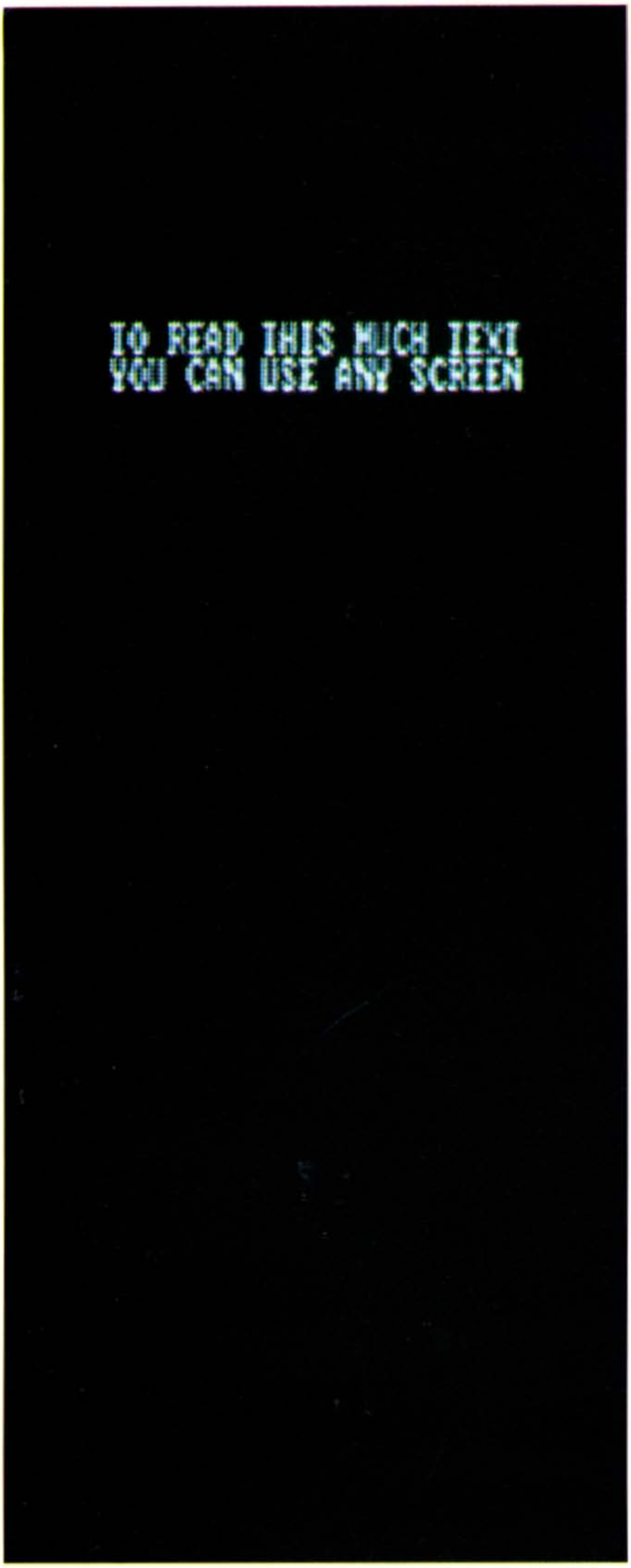

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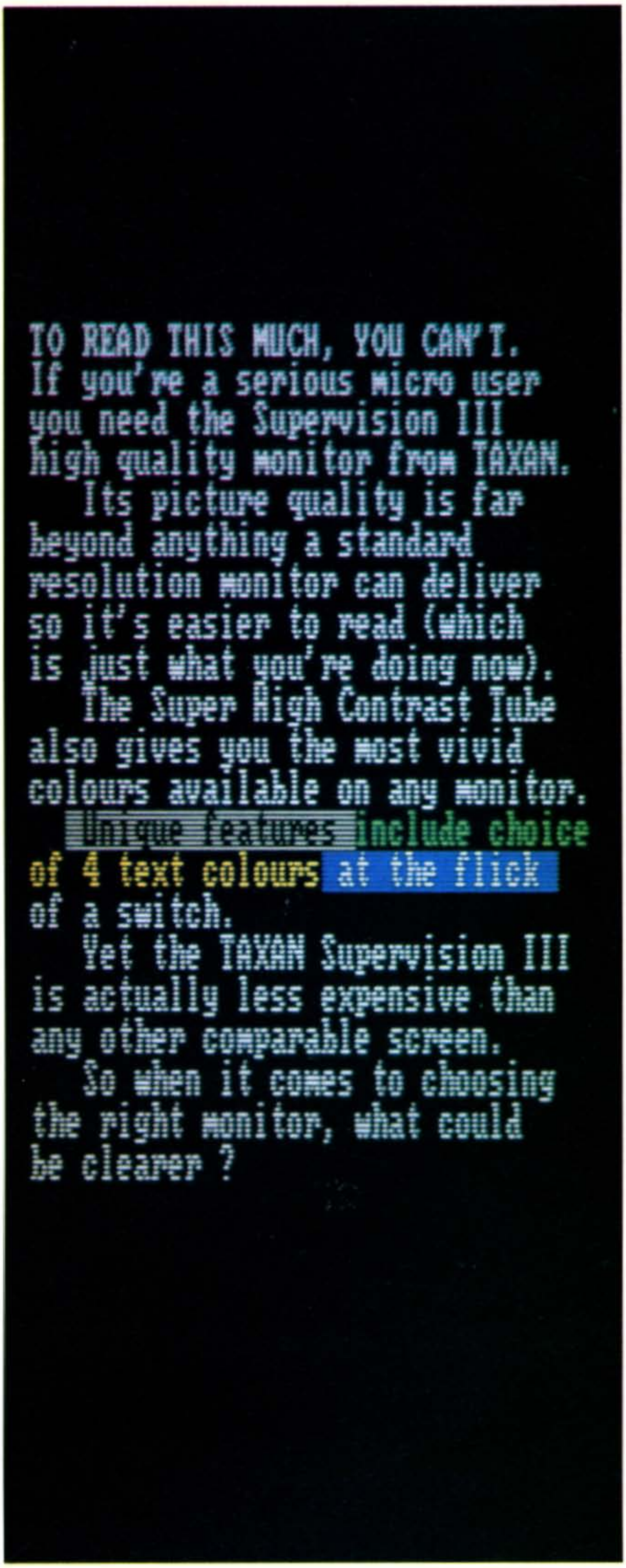

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THE MICRO USER

October 1986

NEWS

THE COMPACT IS AIMED AT THE ENTIRE FAMILY

ACORN has launched the machine with which it hopes to capture the imagination of the whole family.

The 128k Compact features a built-in 3.5in disc drive and carries a basic price tag of £399.

Bundled with a monochrome monitor, it costs £469. For a colour system the price tag is £599.

All three packages include software worth in the region of £150.

Acorn is known to be relying on its name for quality to carry it through in what is becoming an increasingly competitive marketplace.

By refusing to join the ratpack led by such rivals as Amstrad in the cut-price stakes, it is taking a calculated risk that prestige still counts among purchasers.

"Our market research has shown that quality is very important," Jeremy Preston, Acorn's marketing communications manager, told *The Micro User*.

"People still aspire very much to own a machine in the BBC Micro mould".

However the Acorn official readily admitted that some people were waiting to see how the machine would fare against the new Amstrad PC clone, also out this month. "We feel that machine is aiming for a different market, a different lot of people", insists Jeremy Preston.

The Compact has been targeted at three specific groups. In the run up to Christmas it is being aimed at the discriminating home buyer.

Following the seasonal rush, Acorn will concentrate on the primary school market where it already has an 82 per cent share, and small businesses.

"We feel it will have a very big impact particularly in primary schools", says Jeremy Preston. "Not that it will be a case of trading in their old BBC Micros but simply buying the Compacts as additional hardware".

The machine is also expected to be popular with the first time user in the small business market. It offers a pull-down menu environment which gives access to a new version of View, a card index program, Logo, a note pad and a calculator.

"We see the Compact as the ideal family machine in that it offers something for everybody", says Jeremy.

A LEADING supplier to the Acorn market has claimed that more than 40,000 Compacts had been sold before the official launch. However an Acorn spokesman refused to comment on the story.

Yet the source of the claim – Nazir Jessa of Watford Electronics – insists that the information had come from "a completely reliable source". He told *The Micro User:* "I have no doubt that Acorn has already sold more than 40,000 machines – many to Europe – it's that good a micro".

ADD – ONS RUSH BEGINS

THE race to provide the first new product for the Compact has already been won, claims a Surrey company.

Even before the machine came out from under wraps, Advanced Computer Products announced its Compact compatible utility program.

The Advanced Print Buffer boosts the existing facility in the machine from 63 bytes to more than 14,000.

Running in sideways RAM, it means that Compact users can get on with other tasks on the machine while letters, reports and documents are printed out.

Supplied on a 5.25in disc, it costs £5.95 and is compatible with all BBC Micro and Master models.

ACP has also launched Compact versions of four of its existing products – the Advanced Disc Toolkit, the Advanced Disc Investigator, the Advanced ROM Manager and the Advanced 1770 DFS.

"We feel there is going to be a very big market indeed growing up around the Compact", says John Huddlestone of ACP.

"That's why we were very keen to get in there as fast as we could".

Meanwhile ACP is currently working on a number of top secret hardware add-ons and expansion boards for the Compact. "You just can't afford to stand still in this business", says John Huddlestone.

Nor has the company forgotten its commitment to the rest of the Acorn range in all the excitement of the Compact launch.

The company is also offering a new Advanced BBC E00 DFS. Priced at £19.99, this makes it easier to run tape software – without loss of memory – on the B+ or upgraded BBC Micro with a 1770 interface.

Super show

THE show that broke all existing records in the spring is set to repeat the performance when it returns to the Royal Horticultural Hall, Westminster, London next month.

Pre-Christmas bargains and exciting new products will fill well in excess of 100 stands at the Electron & BBC Micro User Show, from Friday to Sunday, November 7, 8 and 9.

All the major producers of software and peripherals for Acorn machines will be there again, their enthusiasm fuelled by the tremendous success that attended the spring show.

On that occasion turnstiles had to be closed several times as more than 16,000 visitors turned up, stand holders did a record £1,200,000 worth of business, and an all time high of more than 500 special offers were displayed.

Last time support products for the new Master series were a main attraction. This time the spotlight is likely to focus on the Compact and M19 machines.

But there will also be plenty at the show to interest the vast army of BBC Micro and Electron owners.

Try a new line . .

LATEST release from Wigmore is Easicall, an automatic telephone dialler enabling users to dial from a directory stored on a BBC Micro or Master.

Database software techniques are used so that part of a name, street, town or even a few letters are sufficient to shortlist the possible numbers.

The directory contains up to 150 names, addresses and numbers per disc on the BBC Micro and more than double this on the Master.

As it has its own interface, external sources can be used to trigger a call. Price: £89.90.

WIGMORE
Easicall
Ready
On Line
PHONE
PORT

They're Body Building all over the world

SINCE technical editor Mike Cook's Body Building series started in *The Micro User* three and a half years ago its fame has spread around the world.

The popular guide to getting more from your BBC Micro without spending a fortune on add-ons produces a regular stream of requests for body builder kits.

Right now Mike Cook is busy filling orders for kits needed in places as diverse as Australia, Iceland and Egypt.

One big order is from the coordinator of a computer education programme for a group of independent schools in Tasmania.

It is for body builder kits and sensors which turn the BBC Micro into a pulse rate monitor, like those to be found in amusement arcades and leisure centres which use infra red beams to measure blood flow in the fingers.

"The fact that this appeared in *The Micro User* as long ago as April 1984 may sound suprising", says Mike Cook, "But the kits don't seem to date at all, probably because they are mostly unique and provide the BBC Micro with functions unavailable from other sources".

Coincidentally, Mike is also shipping a pulse rate kit to a young student in Queensland, Australia, who wants it for a school science fair project.

The Egyptian order is for Cook's sound sampler, subject of a three-part body builder series earlier this year. It will be used by a lady taking a PhD in speech recognition at Cairo University.

Since the Body Building series began in 1983 the inventive Mike Cook has come up with more than 40 different packages for BBC Micro owners, and they are in use all over the world.

MICRO WAY TO HEALTH

ACCIDENT victims recovering from their injuries are using BBC Micros to help them undergo remedial therapy in their own homes.

The project is run by the Burden Neurological Institute in Bristol in conjunction with the city's Frenchay Hospital.

Patients use a BBC Micro and modem to link up with the Institute's master computer which selects exercises taking into account the type of injuries and degree of recovery.

The specially designed exercise program ranges from improving focus and concentration by following a brightly coloured image around the screen, to complex memory tests and manual coordination.

Project leader Dr Hatch Curry described the exercises as thinly disguised games which were originally issued to patients for unsupervised use at home.

But this meant patients' progress was not controlled or monitored directly and many tended to do only the easier exercises instead of moving on to greater degrees of difficulty as they got better.

Then the main computer arrived "which put control back into my hands and enabled me to monitor and store results without reducing the pleasure and motivation the patients get from their micros", said Dr Curry.

Patients can opt for one of five menus in each type of exercise. They can also select the speed at which they wish to play.

A voice simulator tells them when they have performed an exercise correctly and when they have made an error. The micro plays a tune when a particularly good performance has been recorded.

The system, open weekends and evenings so users can take advantage of cheap phone rates, is handling 10 patients, but Dr Curry hopes to work up to 50 eventually.

The exclusive that wasn't

A front page "Exclusive" in the August 24 edition of the News of the World wasn't quite as exclusive as it appeared.

For the story had already been carried in the previous issue of *The Micro User*.

It dealt with a medical research project in Manchester which is trying to establish whether or not there is a link between the traditional British cuppa and ulcers – or even cancer.

Not that it is what's in the tea – or coffee – that may be causing the conditions, but rather the fact that people may be drinking it too hot or too cold. For extreme temperatures are known to cause changes in cells which may lead to cancer.

News of the World reporter Adrian Needlestone obviously believed he was first off the mark with his story for Britain's bestselling newspaper.

However he had already been scooped with a genuine world exclusive by *The Micro User's* news editor, Mike Cowley. His comprehensive coverage centred on the BBC Micro playing a vital role in the research.

Fonts galore

WITH the release of a new disc, CJE Micros now offers 33 fonts with its Fontaid NLQ definer for the BBC Micro. The Fontaid Disc B, 40 or 80 track, costs £15.

The company has also released Inform, developed to take advantage of the BBC Micro's sideways RAM facility and compatible with most units including ATPL Sidewise, Solidisc SWR, BBC B Plus 128k and Master series.

It allows the user to display text information of any kind from sideways RAM and instantly access it by using *I commands from keyboard or application programs.

Inform comes on 40/80 track disc and costs £20.

Locked up data

A DATA security system, Lock-Tight, has been launched by Advanced Technological Research for BBC Micro owners who have registered under the Data Protection Act 1986.

It provides a locked area around data or software. Once the supervisor menu set-up has been completed only users with authority have access, and then only to the options given them.

If no valid password is used no access is given and the computer is disabled. Lock-Tight comes on disc for £39.95 and ROM £44.95, with versions at the same prices for owners of Computer Concepts G-Code ROM.

Version 2 plus G-Code ROM costs £54.95 on disc, £59.95 on ROM.

Compact at the big Northern Show

MOST of the manufacturers and suppliers exhibiting at the Electron & BBC Micro User Show at UMIST, Manchester, have confirmed that they will be bringing with them a host of new products and bargains galore.

The great northern showcase will feature the new Compact and M19 machines alongside all the latest releases for the BBC Micro and Master series.

Micro-Aid has just announced it will be launching its Accounts Plus package which includes automated statement and mail facilities, price £49.95.

The firm will also be unveiling the new WIZ card cursor controller for the BBC Micro which has eight angled directions and sensitive fire buttons, as well as the new Viziflex keyboard protector.

Centec will be taking its new range of 96 TPI double-sided discs, specially designed for the BBC Micro, which will be sold at trade prices, and will have Master series machines available at reduced prices.

Meedmore will be unveiling its new analogue mouse, the Whisker, which is BBC Micro and Master compatible, costs £39.95, and can be used with AMX and Bitstik software.

Tynesoft's new release Futureshock is a multi-screen arcade adventure. Along with other recent releases it will be offered at special show prices.

Advanced Computer Products will have the E 00 DFS for the BBC Micro, B Plus and B1770, enabling users to run a disc filing system on E 00 from sideways RAM instead of 1900.

Solidisc is launching Swindoff, sophisticated BBC Micro software for up to 256k of sideways RAM enabling current screen activities to be carried out while previous tasks are proceeding.

And UviProm, an eprom programmer capable of blowing eproms ranging from 8k to 64k, is another new product from Solidisc, this time for the Master and BBC B Plus, price £30.

The Multi-Font NTQ printer driver from Permanent Memory Systems is ROM-based software for BBC Micro, B Plus and Master owners with Epson RX/FX compatible printers and will be offered at a special show price of £29.95.

Also new from PMS is the B2P 6502 second processor, price £99.95 and a Tube Utility ROM price £19.95.

Care Electronics will have its own Master cartridges on sale at "about half the price of Acorn's" and a ZIF socket version for users who want to change eproms quickly.

Viglen is releasing a Master console unit at £79, a £16.95 system allowing use of ROM cartridges via an adaptor and providing four easily interchangeable cartridges on the Master, and a £700 Winchester system which holds up to 112Mb and is capable of being dualled to allow back-up.

Norwich Computers has a new utility ROM for Wordwise Plus called Pen-Friend which provides many of the drop-down menu facilities normally associated with more powerful word processors.

Trafford Computing is launching a £32 Fileman random access database management system following its successful trials in GCSE computer studies courses.

Electronics giant GEC Telecommunications is selling its Datachat 1223 modem and software package bundled with BBC Micro comms pack and subscriptions to MicroLink, Prestel and Micronet for £79.95.

Shards Software has a new BBC disc compilation of 11 games, educational programs and utilities at a budget price, a sound and light utility disc including sound and painting routines, and is launching Operation Safras, a multi-screen adventure game.

As a respite from shopping, visitors can drop into the Acorn Theatre where every day leading BBC Micro, Master and Compact experts will be describing how to get the best out of their machines.

- *The show is open 10am to 6pm Friday and Saturday, September 26 and 27, and 10am to 4pm Sunday, September 28 in the Renold Building, UMIST – five minutes from Piccadilly railway station.*

Now – Instant Mini Office

A ROM version of the top-selling Mini Office II is to be launched at the Manchester Electron & BBC Micro User Show.

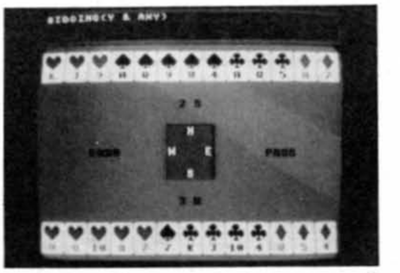
Contained in four chips on one board, it allows immediate access to the six modules – word processor, database, spreadsheet, graphics, label printing and comms.

The latest sequel to the original package that was shortlisted for two British Microcomputing Awards, it is compatible with the BBC Micro, the B+ or the Master.

The new ROM board has been developed to meet the needs of both the small business and the education markets.

A price has yet to be decided, but is expected to be around £50.

Bridge tutor



AN enhanced version of Minic Business Services Bridge-Mentor is now available on disc for the BBC Micro and Master series.

Bridge-Mentor 2 uses an archive of 60 expertly analysed deals, covering techniques such as dummy reversal, squeezes and loser on loser.

Aimed at players who want to improve their technique, it is based on the principle of discovery learning rather than rote, that is the program aims to guide, not instruct, the user.

It chooses a predecided contract and gives no other information on how to play the hand.

If a poor decision is made the program refuses to play the trick, but leaves the player to analyse why it was unwise.

Other features include an auto-play option, realistic simulation of playing cards and bridge table, and the ability to expand the archive. Price: £17.50.

Three years ago

Another look back at what *The Micro User* covered just 36 months ago – a lifetime in the fast changing world of computers. This was the issue for October, 1983:

electron user
THE MICRO USER
Gone Fishin'

ACORN Computers has branched out into the world of motor racing. It is to sponsor a Formula Three car throughout the coming season at a cost of £90,000.

The Acorn driver has been named as David Hunt, the 23-year-old brother of ex-world champion James Hunt.

* * *

Five years after its formation, Acorn's turnover has reached £42 million, placing it in the top five UK computer companies along with ICL, Ferranti, Systime and Sinclair. The company has revealed that it will be employing 400 people by mid-1984.

* * *

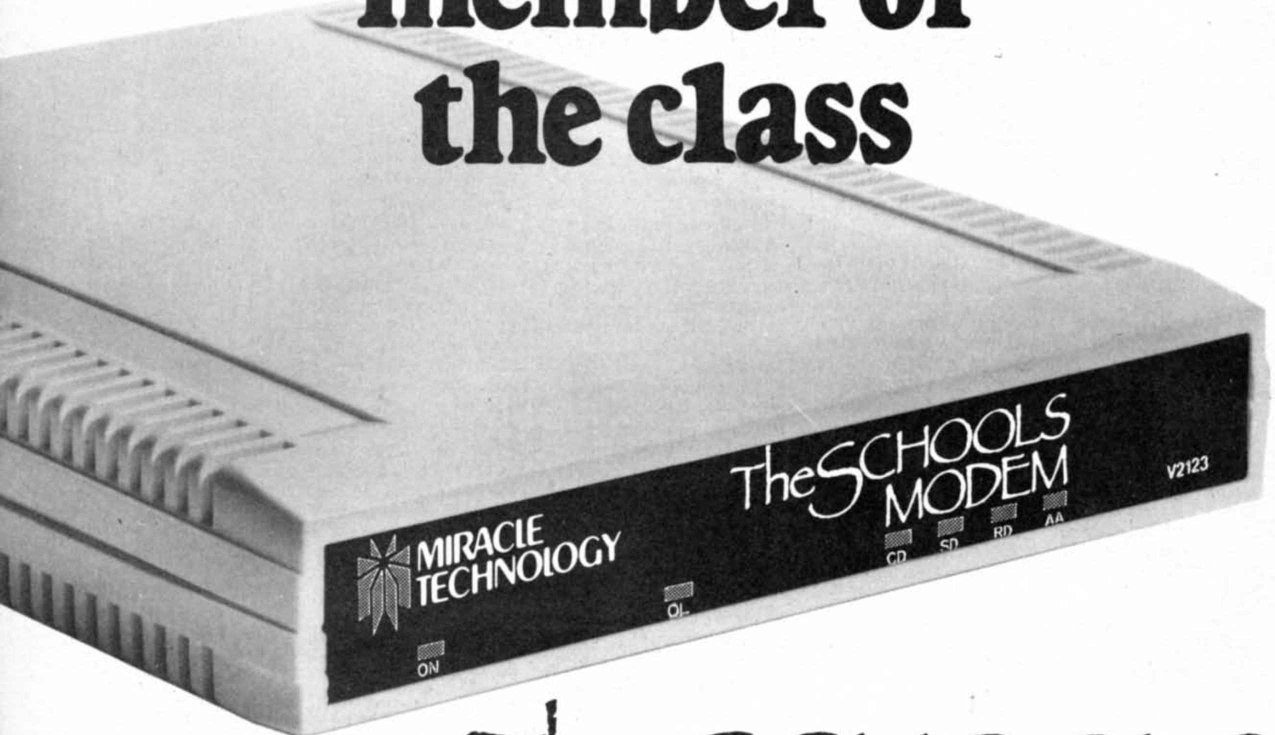
The BBC Micro User Show in December will be one of the first major events to be held in the world famous Royal Horticultural Hall following a £500,000 refurbishment programme.

Fifty tradesmen are currently on site working against the clock to complete the facelift.

* * *

The Micro User *contained the first edition of* Electron User – *"the exciting new magazine for users of Acorn's latest micro, the electrifying Electron".*

An intelligent member of the class



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"We need a fully intelligent V21/23 modem," you said, "because we want to use Prestel* and educational databases like Schoolink* and TTNS*. We'd like Hayes compatibility, so we have a good choice of software. With autodial and autoanswer please, and so user-friendly a child can handle it. Cost counts, so it must be inexpensive NOW, but upgradeable LATER so it doesn't become obsolete when our needs change."

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'Allo 'Allo 'Allo

FOR the first time it is now possible to access Teletel, the French viewdata network, using a BBC Micro and modem.

David Lisbona, an enterprising North London BBC Micro enthusiast, has broughout out T, a Teletel emulation package, that performs the same function as dedicated terminals costing many hundreds of pounds.

Lisbona, a naturalised Israeli BBC enthusiast trading as Aldoda International, has also released D, a communications language for the BBC B and Master.

T is a full Teletel ROM package, using an extended Mode 1 screen on the BBC to emulate the complex graphics of the French viewdata system.

Included in the £28.50 package is a comprehensive manual which steps the first-time user through the mysteries of the French system, which is totally different to most other on-line systems.

Lisbona says a special London gateway to the complete Teletel system in France will be coming onstream later this year to support T ROM owners.

In the meantime users may consult the manual for detailed instructions on how to connect with Teletel, either via direct dial, or packet switching networks, like BT's Packet Switch Stream or Mercury's Data Network.

D, the communications language, is described by Lisbona as a package which will "revolutionise on-line access to services such as Prestel or Telecom Gold and MicroLink".

Two versions of D are available for BBC Micro owners, one for viewdata, and one for scrolling Ascii services.

Each version of D costs £25, with both available on one disc for £37.50.

Completing the trio of comms orientated packages is the Fred viewdata editing package for use with Prestel and Micronet frames.

Who wants to be a millionaire?

NAZIR Jessa, the wealthy boss of Watford Electronics is looking for an apprentice millionaire.

And he promises that within five years it will be a rags to riches story for the youngster he plans to pluck from the dole queue if necessary.

"I started with very little and now have a very comfortable life style," says Nazir, one of whose symbols of wealth is a Rolls Royce.

"So now I want to do something for someone else who is just starting out in life."

Not that Nazir Jessa intends to offer the incredible job on a plate.

"He or she is going to have to show they deserve it", he insists. "For people do not respect anything they get for nothing".

So any would be applicant for the position is going to have to prove their worth in the field that Nazir Jessa knows best – computer electronics.

What he will be looking for is a youngster who is computer literate – and who can demonstrate ideas.

"Having thought about the fact that literally thousands of youngsters are likely to want to be an apprentice millionaire, I had to come up with a quick way of whittling the numbers down," he says.

"After all, I don't want to spend the next year interviewing kids do I? You see I've still got a business to run".

Nazir Jessa has decided that each applicant must forward a marketable idea – either software or hardware – for the BBC Micro or Master ranges along with a letter stating why they feel they would best qualify to become an apprentice millionaire.

"That will show to me that the youngster I take on deserves not to be on the dole", he told *The Micro User*.

"From there on, he's going to have to work – just like any other apprentice – only this time the rewards will be so much higher".

Nazir Jessa hopes to be able to narrow the final choice down to three – with the apprentice millionaire being named at the November Electron & BBC Micro User Show in London.

The final choice will be left to a distinguished panel of judges after the trio have spent a day living like millionaires in London's West End.

All three will be put up in a top London hotel, dined at the finest restaurants and chauffeured around in the Jessa Rolls to ensure it is a day that even the losers will remember for the rest of their lives.

NOW BBC USERS HAVE US DATABASE CONTACT

MICROLINK has just achieved a world first by creating a permanent electronic link across the Atlantic. It will allow owners of BBC and other micros to log on in a matter of seconds to one of the most dynamic databases in the USA.

And the cost will be approximately half that of a conventional transatlantic telephone call.

The breakthrough has come about as a result of a deal struck between MicroLink and Mnematics, based at Sparkill, New York.

With the help of its US partner, MicroLink has set up a complex electronic gateway which will enable the exchange of messages between micros in the US and the UK.

The new service was officially opened when Derek Meakin, head of MicroLink, sent the first message to his opposite number at Mnematics, Gregg Squires.

Seated at the keyboard in his office in Stockport, he simply typed the letters MNE. Without any delay a welcome message from New York appeared on his screen. Then he typed:

"Dear Gregg – This is a historic moment . . . the opening of the first-ever transatlantic gateway to enable micro users in the UK to talk to their fellow enthusiasts in the USA.

"On behalf of many thousands of MicroLink subscribers in the UK, together with many others who have joined us from countries all round the world, I send greetings to you and everyone at Mnematics.

"From now on we're all going to have lots to talk about".

The UK-USA computer link opens up a host of new services for subscribers to MicroLink.

They will be able to choose from playing real-time games to participating in the activities of more than 40 special interest groups.

And with Associated Press providing a 24 hour global news service, there will be no need to even wait for the radio news.

"We are just delighted that we at MicroLink are able to offer this first", says Derek Meakin. "It's going to transform the way we communicate with our cousins over in the States".

Now Gregg Squires hopes to open a reverse link – to allow micro users in the USA to share all the facilities of MicroLink.

Second processor relaunch

THE DMS 68000 second processor from Delcomm Microcomputer Systems has been relaunched by CA Special Products as Casper 68000. It is unchanged and the price remains at £299.

Delcomm managing director Philip Smith said: "The level of inquiry for the package has been so strong that we decided to sell the rights to specialist marketing company CA".

However Delcomm is continuing to design upgrades for the 68000. A 512k RAM add-on and extra IO boards are being released through CA.

Green fingers guide

GARDENERS get a helping hand from Planter's Guide Pack, for the BBC Micro. RAE Associates have listed more than 1,000 plants and by keying in the conditions found in the garden a list of those suitable will be displayed.

The system adds the height, colour and best month for display of every plant listed. An accompanying book gives a comprehensive description of each plant, plus a botanical/common and common/botanical index.

The book costs £8.85 and the Planter's Guide Pack £14.95.

Enter the Boggit

GOBLINS and "horrible furry spiders" are encountered in a new adventure game for the BBC Micro.

The Boggit, from CRL, has the ancient wizard Grandalf tricking Bimbo into a quest to find a dragon's secret cave.

The game is split in three parts and has over 100 locations. Price £7.95.

BBC Micro gives the sheep a hand

THERE are no flies on the BBC Micro in the Zoology Department at Edinburgh University – but the machine is keeping a careful eye out for them.

A research team there is using its Model B to monitor the movement of blow flies, the pests that feed on the flesh of unfortunate sheep.

It is all part of a study to see whether or not the creatures have body clocks. For if they do, it may well prove possible to disrupt them and so help control the problem for sheep farmers.

By keeping their specimens in timeless conditions – total darkness at a constant temperature – the scientists are hoping to assess the blow fly's biorythmns.

Each of the flies is housed in a four inch plastic saucer where it is fed on sugar and water for its lifespan – approximately three weeks.The blow flies are in fact bred at the university before being transferred at pupa stage to the experiment.

And there they remain under the constant gaze of beams controlled by the BBC Micro, with each movement faithfully recorded and timed.

Restricted

When the research first started the number of flies under scrutiny at one time had to be restricted to eight. It wasn't due to any shortage of flies but rather to the fact that the BBC Micro is limited to an 8 bit user port.

That remained the situation until one of the Edinburgh team spotted an article in the December, 1985, issue of *The Micro User*. It was by technical editor Mike Cook and was part of his Body Building Course series.

The article revealed how it was possible to add extra output/input capabilities with a multiplexer package. Now thanks to Mike Cook, the researchers can study 32 flies at one time.

"It has made a considerable difference", said Dr. Bob Lewis, a New Zealander involved in the project, "for the greater number of subjects, the more data you can collect".

What has the Edinburgh research revealed to date?

"We have established for certain that even the most simple species do have body clocks", said Dr. Lewis. "It has shown that even in timeless conditions the flies still respond at their usual waking, sleeping and eating times – even when they spend their whole lives under these conditions".

Along with Dr. David Saunders, head of the project, and research student Niall Kenny, Dr. Lewis hopes to carry on with the study until the information gained proves valuable to other scientists hoping to alleviate the blow fly problem.

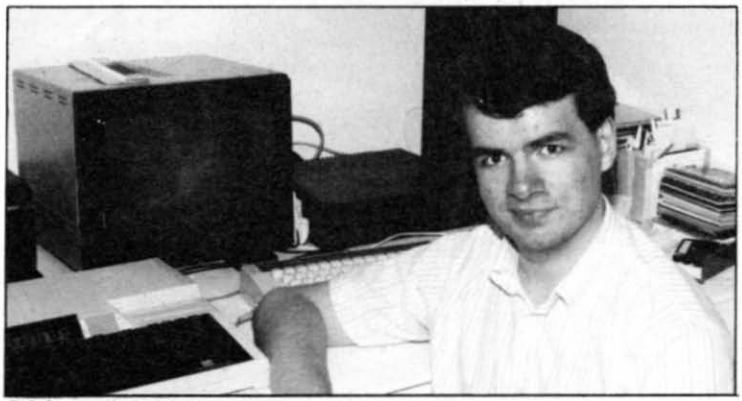
"It will be up to them to do something with it", said Dr. Lewis, "for us it is a pure research project".

Should it prove useful in this area the BBC Micro may well have found itself playing a leading role in doing away with sheep dip – the solution currently used to control blow flies.

Ribbon deal

A NEW ribbon for old scheme for BBC Micro printers has been set up by Aladdink. Used ribbon cassettes sent to the new Scottish company will be returned "within a few days" re-inked and ready again for use.

The service is available to anyone by posting a used cassette, together with a remittance equal to one third of its original price with a minimum of £1.



Galaforce author Kevin Edwards

PARTNERSHIP BOOSTS SOFTWARE

ACORN and Superior Software have become partners in an arrangement that is good news for BBC Micro owners.

The companies are combining forces to provide a continuing supply of top quality games and home entertainment software for Acorn machines.

Programs released under the agreement will carry a joint Acornsoft/Superior Software logo.

The arrangement provides for new programs to be written by Superior Software's team of authors. In addition several existing Acornsoft titles will be repackaged.

First of the new BBC Micro programs is Galaforce, written by Kevin Edwards, a former member of the *Micro User's* editorial team. Superior Software calls it "the ultimate shoot 'em up game".

It comprises a series of screens, with aliens flying in 50 different formations, and a high score competition.

Galaforce will be followed by Stryker's Run, an animated fighting game for the BBC Micro, with an enhanced graphics version planned for the Master 128.

Acorn's contribution will include two compilations with four games on each. Elite will be among the re-released titles included.

Prices are expected to be £9.95 on cassette and £11.95 on disc.

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For Canon & Taxan Kaga users we recommend FONTAID in preference to Multi-Font NLQ.

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EXAMPLE OF MFNLQ FONTS

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Additional disc 'A' gives an extra 11 fonts including:-
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Now included is a facility to issue * commands within a VIEW document.
To download new fonts within VIEW documents, the FONTAID ROM needs to be fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all the printers control codes is still allowed. The resolution of the FONTAID NLQ is also slightly higher than that of Multi-Font NLQ.

FONTAID requires 6264 RAM chip in printer.

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INFORM is a very powerful facility, which allows the user to display text information, of any kind, from Sideways RAM. This information can be readily accessed by using * commands from the keyboard or from application programs. In this way, much information can be displayed on the screen without stopping the current task, such as entering text in WORDWISE or VIEW.

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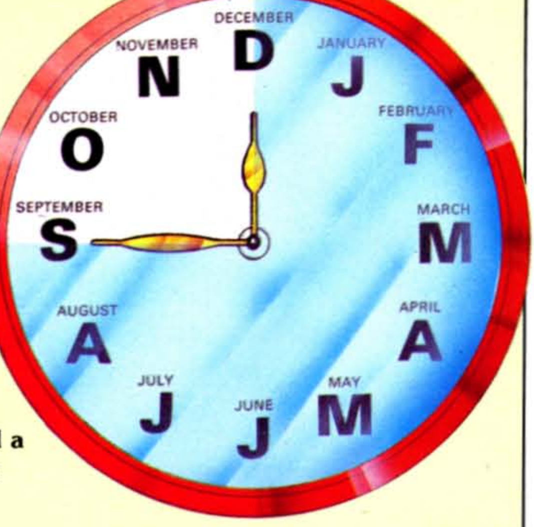

For BBC Micro and Electron users this is the start of the top buying period of the year – the time when they stock up with all the latest hardware and software that will enhance the versatility, power – and just sheer fun! – of their micros.

And the ideal time to hold the Electron & BBC Micro User Show, where they get the best of both worlds – a first look at all the fascinating new-season products, and a chance to pick up really worthwhile bargains as yesterday's top sellers are sold at rock-bottom prices!

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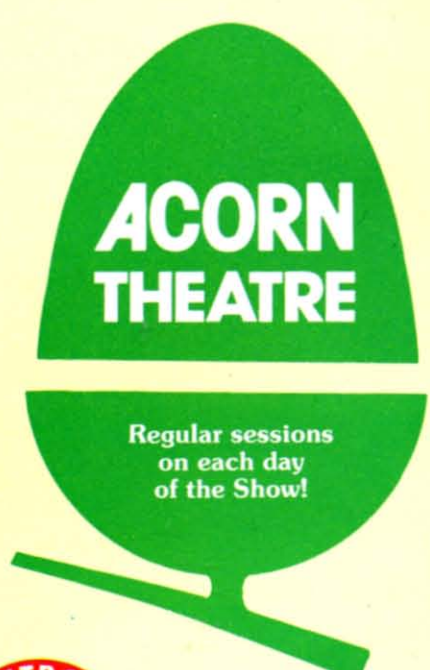

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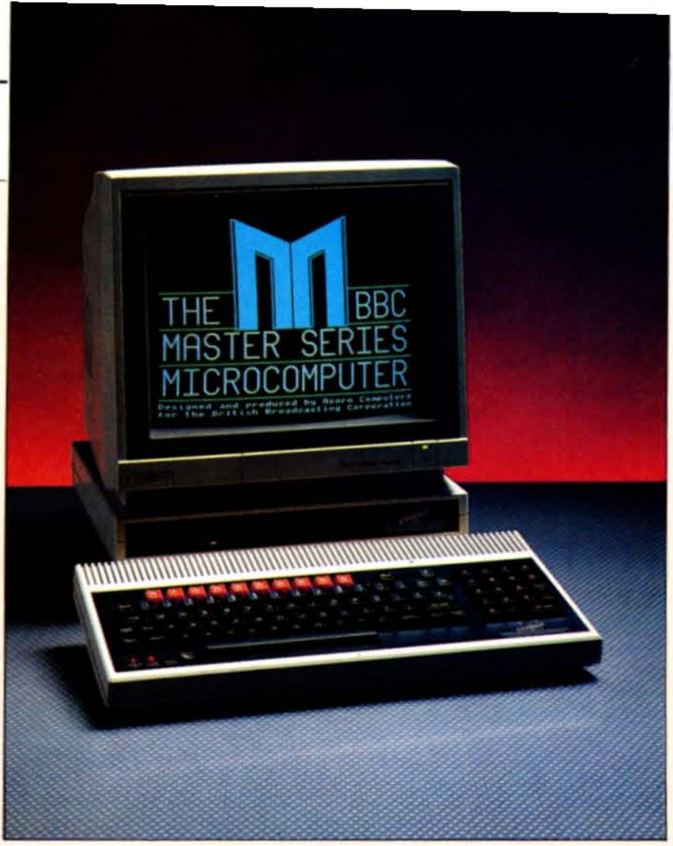

THE BBC
MASTER SERIES
MICROCOMPUTER
Designed and produced by Acorn Computers for the British Broadcasting Corporation

Enter the Compact – the micro that's got the lot!

By
Mike and Pete Bibby

IT'S called the Compact, and Acorn's latest micro certainly is. In fact it's not so much a computer as a complete computing system – micro, monitor and disc drive combined to give a completely new entry point to the BBC Micro range.

And it *is* part of the BBC Micro range. Far from being an Electron upgrade, the Compact is firmly in the Acorn's innovative Master series.

At the heart of the system is the 128k microcomputer, which is perhaps best described as a Master 128 with a few frills removed and some rather nice features added.

As is standard with Acorn systems, you won't find a cassette lead in the box. This time, however, it's for very good reasons. Adopting a marketing strategy that other manufacturers have lacked the courage to adopt, Acorn has completely discarded the cassette filing system. If you want to use a Compact you have to use a disc.

Fortunately, Acorn provides one with the basic system. It's a 3.5in disc built into the monitor plinth.

And that brings us to the second innovation. There's no UHF output from the Compact, so it has to be used with a monitor. RGB and composite video outputs are provided as standard.

Both these strategies – disc and monitor only – are part of a deliberate policy decision, to create a complete system to cater for what Acorn see as existing market trends away from the "stopgaps" of tape and television.

Acorn will be supplying three versions of the Compact. The basic level features the micro and a plinth with built-in 3.5in disc drive and power supply.

The other two options add a monochrome and colour monitor respectively, powered from the plinth. In practice Acorn sees third-party suppliers offering the basic level Compact bundled with their own monitors.

The Compact is very different in appearance from earlier models in the Master series. While its tasteful shade of Acorn cream makes it unmistakably a BBC Micro, the way the system is put together is new.

The disc drive unit is the obvious point of departure from earlier BBC Micros. It contains a 3.5 in disc drive with 640k capacity, plus the power supply for both the micro and monitor.

The drive is numbered drive 0 and there's room to its right for a second disc drive to be fitted. There are even hints that a third party supplier (not Acorn) may wish to put a slim-line hard disc here.

Whatever expansion is available, the unit certainly helps create a tidy – yes, compact – micro.

Two cables lead from the disc unit to the back of the keyboard unit. The first is a 5V power supply, the second a ribbon cable from the discs.

There's another cable from the back of the disc unit to the monitor, also supplying power. And, of course, there's the additional RGB or composite video lead to carry the screen signal between the keyboard and monitor.

That might sound like a lot of wires, but in practice the Compact's leads are a lot neater and less spaghetti-like than most other micros.

And with just one lead from the mains to the disc drive unit there's less pressure on available power points. In an education environment this is a telling point in favour of the Compact.

Lurking at the back of the power supply is the on/off switch for the computer. When on, a red LED lights up on the front of the keyboard. There's also an on/off switch for the monitor, a point to remember when wondering why nothing is appearing on the screen. The monitor, which is produced for Acorn by a well-respected manufacturer, also has brightness and contrast controls.

The computer unit itself is a small, neat wedge-shaped box that just asks to sit on your lap as you type. The keyboard layout is reminiscent of earlier members of the Master series with slight differences.

Basically it's the standard alphanumeric keyboard beloved of typists, along with more specialised keys such as Copy and Ctrl. Above this are the 10 red programmable function keys (ready to provide up to 40 different actions) while to the top right the cursor control keys appear in a tasteful grey.

At the right of the main keyboard is the numeric keypad, consisting of the

→

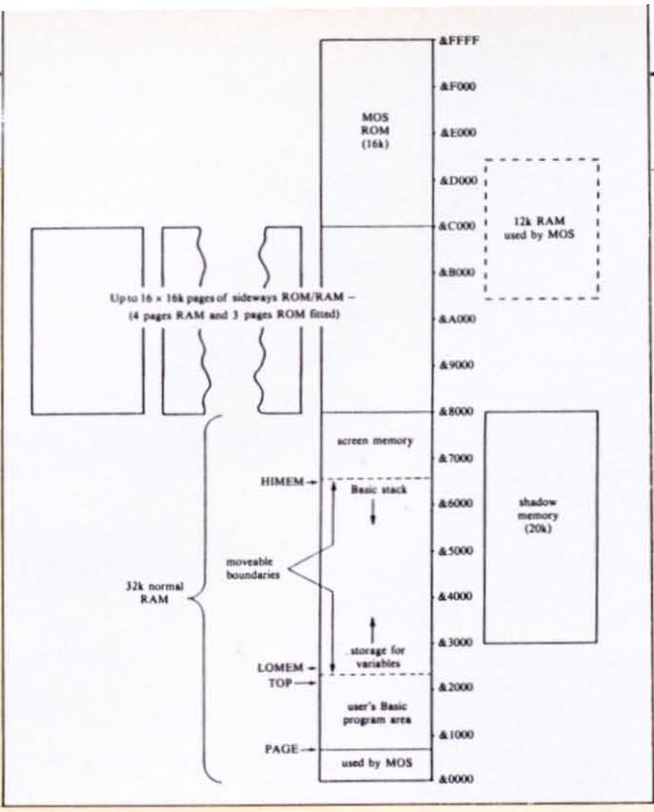


Figure I: The Compact's memory map

From Page 17

numbers 0 to 9, the four basic maths operations, a full stop for the decimal point, the hash symbol, #, Return and Delete.

The keys themselves simply duplicate those on the main keyboard. This may seem a bit redundant, but they make entry of numeric information much easier as the numbers are closer together and you don't have to use Shift to get the operators.

As in earlier versions of the BBC Master, the Break key can be disabled by turning the screw to its left through 90 degrees. This is something that will be appreciated by anyone who's lost hours of work by an inadvertant Break.

There are only two more points to be made about the Compact's keyboard. The first is that there's a new symbol on the key next to P.

In earlier BBC Micros this used to be the @ or "at" sign. This however has been banished to the top of the 0 key and replaced with what looks like two squares, one on top of the other. Pressed in conjunction with Shift and Ctrl, it has the next character typed reinterpreted as a special symbol. This allows expansion of the range of characters that can be generated by the keyboard, a useful feature for foreign language work.

The second point is that this is a membrane keyboard. If this immediately brings to mind the "rubber" Spectrum, there's no need to be afraid. It's a very superior membrane keyboard, so much so that most people have to be told that they're using one.

Far more noticeable is the lack of a holder for function key strips, despite the fact one is supplied for the View and ABC packages. Here's an opportunity for an enterprising manufacturer...

All in all, it's a stylish, good-looking layout that lives up to the name Compact.

The machine comes with a detailed Welcome Guide that should satisfy the newcomer's needs. However the more advanced user will find the documentation rather sparse.

The Welcome disc, happily, is crammed with more than 400k of goodies, including five application programs, utilities, tutorials, graphics demonstrations and even two games.

Like the Master, the Compact uses Basic IV, the latest and fastest version of BBC Basic which makes full use of the extra instructions of the 65SC12 microprocessor.

Basic 128, which allows 64k for programs, is available from disc.

The Compact's memory usage is similar to that of the rest of the Master series. Figure I gives a full map.

Page is kept to &E00 by using 12k of RAM as MOS workspace, and there's 20k of shadow memory activated by the *SHADOW commands.

As usual, the operating system caters for 16 sideways RAM/ROM sockets. Of these sockets 4 to 7 are 16k pages of RAM, while sockets 2, 3 and 8 (ICs 23,17 and 29 on the board) take 16k ROMS.

IC 38 can take either a 16k or a 32k eprom (sockets 0 and 1) but is normally set to "external". In this mode it looks at the expansion port for these ROMs – all it needs is for that same enterprising manufacturer to come up with a cartridge adapter.

Having taken care of ROMs 0 to 8, we'd better explain the ones remaining, 9 to F. On the normal Master these seven 16k sockets are taken up with the megabit ROM, the last 16k being devoted to the MOS.

The Compact though, comes supplied with only a half megabit ROM, leaving room for three "16k roms" after the MOS. Socket D holds the ADFS, E has Basic and F Utils. The latter contains all sorts, including filing system utilites such as *BUILD, *DUMP and so on.

One nice feature is that the *ROMS command has been changed so that it shows which sockets are ROM and which RAM. Also Acorn has amended *SRLOAD so that an additional I installs the ROM image without you having to press Ctrl-Break.

This means, for instance, you could load a sequence of service ROMS and bring them into use within a current Basic program.

All in all, if you're used to programming or simply using a Master, you'll find the Compact a natural progression. Anyone upgrading from an Electron or BBC Micro is going to find a system with all the features they've been missing.

Application programs

THE Master Compact brings with it five application programs. Disc-based, the easiest way to access them is from the WIMP front end.

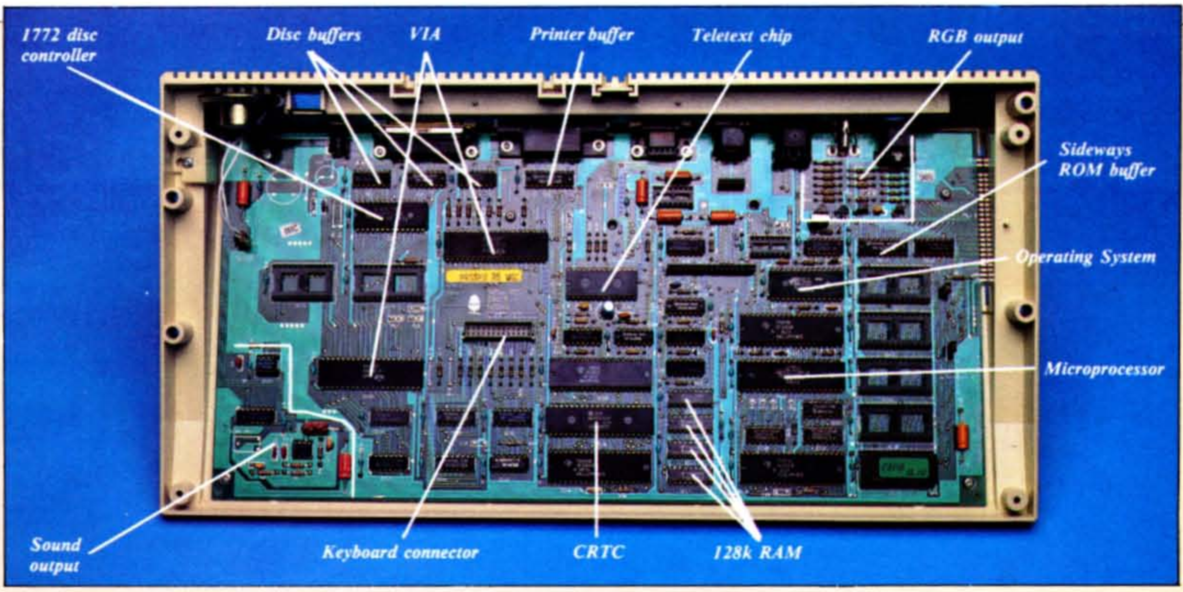
- **DeskTop:** Icon-driven, this office workmate features a Card Index, Calculator and Notepad as well as an on-screen clock and catalog facility.

Card Index is a simple name, address and telephone number database that allows you to search for individual records, save and load files to disc and transfer data to View.

Calculator is a simple push-button calculator operated by pointer.

Notepad is a electronic jotter, ideal for writing quick notes, memos, lists and so on. Files can be transported to View for further processing.

- **Logo:** Interestingly, the version supplied is Logotron Logo, under the title Logotron-Acorn Logo. Choosing this in preference to Acornsoft Logo is an acknowledgement of Logotron's dominance of the education market. A full implementation of Logo, its ease of



Let's take a look inside...

with MIKE COOK

THE Compact is quite easy to dismantle, as the obligatory four screws are marked on a diagram on the underside. The unit splits into two halves, keyboard and electronics, joined together by about a foot of ribbon cable. This cable is socketed at either end and unplugs easily.

My initial impressions of the printed circuit board are of a clean, uncluttered layout with few chips or discrete components. There are also some rather interesting gaps.

The 128k of memory is contained in four small chips, and there are quite a few customised gate array chips performing interfacing and memory management.

One of the five sideways ROM sockets is occupied – in my case by a 128k ROM – leaving four vacant for your own software.

Also in close proximity is the printed circuit edge connector intended for future expansion. This expansion method has been used on many other computers before but only once on an Acorn product – the Electron.

On the Electron, however, the edge connector was gold plated – a sensible move in my opinion. Unfortunately the Compact's is only tinned. I know from experience on other computers that this can lead to reliability problems with whatever is plugged in, due to oxidation of the tinning.

This can be cured simply by unplugging the connector and wiping it with a solvent but gold plating circumvents the problem.

The absence of a UHF modulator means a much simplified video output circuit with far fewer discrete components. Also there is no provision for altering the volume from the tiny speaker.

Looking at the chips used I was impressed to see so much "state of the art" ALS (Advanced Lower power Schottky) and F (Fast) type TTL logic components. These should improve reliability, as they require much less power and will work considerably faster than the older LS (Lowpower Schottky) devices.

I was disappointed to see that there was no analogue to digital converter, which means that joysticks have to be of the switch type and not proportional. Unfortunately many of my Body Build projects utilise the analogue facility of the earlier models.

The keyboard is of the conducting membrane type. The contacts are close running tracks on the printed circuit board, and a conducting membrane is pushed by the key to make contact.

Otherwise the only other things of note were four holes at the corners of the keyboard labelled RFI. Now RFI in my book stands for Radio Frequency Interference and I suspect these screws are for connecting a metal screen to reduce this interference.

Regulations governing the levels of interference permitted by computers are in force only in foreign countries, and I suspect this will be fitted only on export models.

Similarly, there is provision for an inductor and extra suppression components on the power supply – again for export only. Of course, these extra components may well be reflected in a higher export price.

Finally, it's worth noting that all the chips, with the exception of the sideways ROM, are soldered in. This should greatly improve reliability.

To sum up: A neat layout that should be reliable and simple to service.

expansion has led to the development of support products such as Control Logo and Advanced Logo.

The accompanying 54 page booklet gives a step-by-step guide to Logo programming, plus a glossary of Logo words.

- **ABC:** An elementary word processor aimed specifically at young writers, its colourful appearance and straightforward approach make it particularly simple to use. Compatible with View, it's far more fun.
- **TimPaint:** A drawing package that enables you to use the Compact's powerful graphics commands to the full. The screen is split into a large drawing section plus a smaller column down the left hand side which is filled with patterns and icons. By selecting the appropriate icon with a pointer you can draw lines, circles, ellipses, fill shapes with various patterns and copy sections of the screen.
- **View:** One of the most highly regarded word processors for the BBC Micro, this version (3.1) makes the most of the Compact's shadow RAM, giving nearly 29,000 characters free in Mode 0.

WIMPs make it much easier...

THE latest trend in computing is to make things easier for the user, and the Compact takes this to heart by using WIMPs, the easy, friendly way of controlling the micro using Windows, Icons, Menus and Pointers. More on these later.

To get into the "desktop environment", as the WIMP software is known, you simply slip the Welcome disc into the disc unit and boot using Shift + Break. The result is that the disc drive whirrs and a few seconds later the icon software Welcome Page appears.

At first the screen looks a little bare, with a bar containing six words at the top, an arrow or pointer sitting in the middle and a welcome message.

While not much appears to have happened, the potential of this "front-end" screen is enormous. The idea is that instead of typing things in at the keyboard to get the computer to do something, all you have to do is to point to a particular part of the screen and the micro will do what you want.

The things that you point at are words or small pictures called icons and, logically enough, you do the pointing with the pointer.

On the first screen the icons are the words in the bar at the top and the pointer is the arrow in the centre. This can be moved to the chosen icon using the cursor or, better still, a joystick or mouse.

Once moving the pointer has been mastered, you take it to the icon of your choice, in this case one of the six icons at the top of the screen.

You then tell the computer that this is what you want by selecting it with a press of the Return key or the push of a button on the joystick or mouse. This is known as "clicking" for obvious reasons.

So far we've come across the I and P of WIMPs, the Icons and the Pointers. By moving the pointer to one of the icons, say Graphics, and clicking, we see where the M comes from.

As soon as you've chosen, a further series of icons appears below the original Graphics icon. These are the names of various graphics demonstration programs on the Welcome disc.

Front end Welcome screen

You can pick whichever one you want to be run by moving the pointer to that option and clicking as before. The program will be run automatically. If you think about this, two point-and-presses replace a lot of typing!

As the icons under the Graphics icon give you a list of options to choose from, they're known as a menu. Hence the M of WIMPs. And as these menus seem to hang from the original icon at the top of the screen, they're known as drop-down menus, while the set of icons across the top are known as the menu bar.

All the icons on the menu bar of the Welcome screen give you drop-down menus when you select them. Selecting Graphics results in five options.

The next icon is the word Tutorial and, as you might expect, the drop-down menu contains the names of four teaching programs. These guide the novice through the ADFS, using the keyboard, and give demonstrations of the various modes and text styles available on the Compact.

Moving along the original screen, the Games icon gives the choice between playing an adventure and an arcade game, while the Device/Screen icon allows you to change the screen colour and the pointer devices used.

The Filing System

THE main Compact unit contains an 80 track double sided 3.5in disc drive. Although 5.25in drives are found on the majority of BBC Micros and Masters, Acorn must look to the future and after testing the water with the Plus 3 for the Electron has plumped for the smaller discs.

The drive is small, quiet and fast and after using it for a while it's easy to see the benefits of the 3.5in format.

The discs are fully enclosed in a tough plastic case and a spring loaded metal shutter covers the section accessed by the drive heads.

They are very robust. You can slip them in your pocket, throw them on the desk or even drop them on the floor without damaging them. This means that you can give your children or pupils a handful of discs without the worry of a disc being corrupted.

Like the Master – and Electron for that matter – the Compact comes with the Advanced Disc Filing System, or ADFS. This is much more powerful than the old DFS you used to get with the BBC Micro. In fact, Acorn omits the version of the standard DFS it includes with the rest of the Master series.

Although the drive is double sided the ADFS treats both sides of the disc as one. Files may be stored on either side or even half on one side and half on the other.

*The ADFS is a double density filing system and crams 16 sectors on to each track. Since each sector holds 256 bytes, a quick calculation shows that each is capable of storing 256*16*80*2 bytes which boils down to around 640k of disc space. If you add a second drive it means you've got 1.2 mb of storage.*

Unlike the DFS, the ADFS does not limit the number of files on a disc, you can cram in as many as will fit in the 640k. Of course, how many you can actually store depends on their size.

As you can imagine after you've saved 10 or 20 files, it becomes difficult to think of different filenames, so the ADFS provides a neat enhancement to file naming in the form of directories, which overcomes this problem.

Directories may be created to store a particular type of file. For instance you could create a Viewfiles directory which, as you can guess,

		Compact	Master
1	OPEN+CLOSE files*1000	21.8	21.5
2a	PRINT 1000 numbers	10.9	14.4
2b	PRINT 100 strings	43.6	45.9
3a	INPUT 1000 numbers	5.6	8.8
3b	INPUT 100 strings	22.3	23.5
4	BPUT 1000 bytes	5.3	7.1
5	BGET 1000 bytes	2.8	3.1
6	Move PTR 1000 places	6.5	6.8
7a	Write test relative file	45.6	47.6
7b	Read test relative file	22.8	24.2
8a	Write relative file backwards	64.4	71.8
8b	Read relative file backwards	21.4	28.4

If disc speed were the only criterion, the new machine definitely has the edge over the Master, which is itself no slouch. Although some of the difference in speed is due to changes in the ADFS, much of the improvement is due to using the new 3.5in drives.

Table I: ADFS benchmarks

contains View files.

You could create a games directory, utilities and so on. A class of pupils could each have their own directory in which they could store their own programs . . . the possibilities seem limitless.

*A directory may contain another directory, which may contain another directory and so on, although it's best not to nest them too deeply since it's easy to get lost. A directory is selected with *DIR.*

The directories are hierarichical, forming a tree structure. At the top of the hierarchy is the root directory $. This can contain other sub-directories which themselves contain sub-directories, and so on. So a file may be stored within the Adventure directory, which is in the Games directory, which is in the $ directory.

*The great advantage of this imposed structure is that all ADFS commands are local to the Currently Selected Directory, or CSD. So *DESTROY will only destroy those files in the CSD. Even *CAT will only tell you the files in the CSD.*

*Many of the ADFS commands allow the use of a pathname – the path through the directories that you would take to get to the file. So to catalog the Adventure directory from the $ directory without leaving $ you would *CAT.Games.Adventure.*

**CAT lists the files, including directories in the CSD, in alphabetical order and provides additional information on the status of each file.*

The disc drive and ADFS are excellent and compliment a superb micro. The ADFS is both fast, flexible and powerful and its structure keeps discs and programs neat and tidy.

The last two icons, Applications and Utilities, are probably the most useful. The utilities available in the drop-down menu consist of a character definer, envelope generator, disc utilities, a pattern editor (for use with PLOT commands) and Panel.

Panel allows the user to decide the configuration the Compact will be in when it's switched on. This is stored in an eeprom, rather than the battery-backed RAM of the Master.

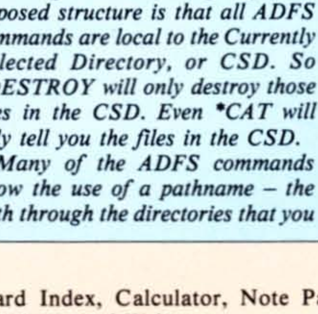
The menu below the Applications icon contains the bundled software, the five programs that come free with the Compact – View, TimPaint, Logo, ABC and the confusingly named DeskTop, a program that makes full use of the desktop environment provided by the icon software.

Exploring DeskTop allows us to explain the W of WIMPs.

Starting back at the Welcome screen, clicking Applications results in a drop-down menu with DeskTop as the first choice. Clicking this has the screen clearing and another six icons appearing in the menu bar at its top. These are Card Index, Calculator, Note Pad, Catalogue and Welcome.

Clicking Clock results in yet another drop-down menu which gives you the choice of setting and displaying a clock. This appears on the screen in a small rectangular box or window. Hence the W of Wimps.

These windows are marvellous things. Clicking Catalogue has another window appearing, this time showing details of what's on the disc. In fact each of the icons on the menu bar (except Welcome, which takes you back to the first screen) results in another window appearing. And each window lets the user get the Compact to do a different job.



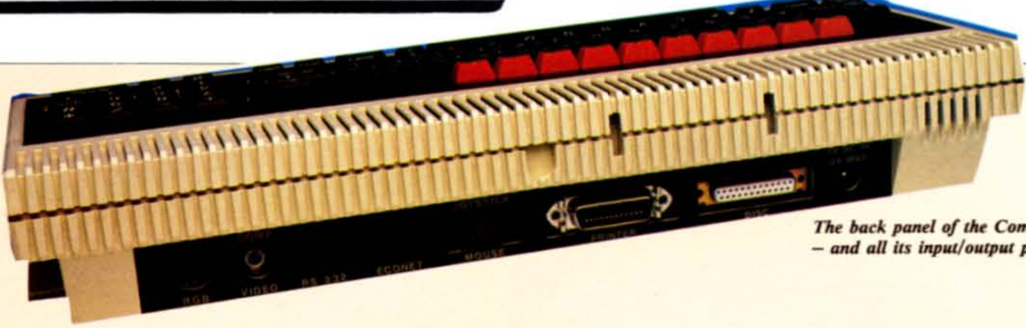
Overlapping windows

As you might imagine you can end up with quite a crowded screen. The Compact can handle it. It allows windows to overlap and obscure each other, but none of the information is lost.

More than this, you can use the point-and-press system to move the windows about to make a tidier screen, enlarge them to show more detail or bring one window to the fore. And, of course, the windows themselves can have icons, so you can effect what appears in them.

If it sounds complicated, it's not. It's child's play – literally, in the case of the editor's six-year-old. All in all, the desktop environment's WIMPs make the Compact the easiest to use micro in its price range.

And as Acorn is encouraging software houses and enthusiasts to use the front end code for their own applications, the Compact's WIMPs are likely to become one of its most important features.



The back panel of the Compact – and all its input/output ports

THE Compact's input/output ports show considerable changes from those on the rest of the Master series machine. Apart from the disc drive and printer sockets, which have been moved to the back panel, all the ports on the underside of the standard Master – user port, 1MHz bus, tube and auxiliary power – are omitted.

Also missing are the cassette port, audio out and UHF sockets from the rear of the machine.

This still leaves the back panel with RGB, composite video, joystick/mouse, printer and disc ports plus power supply input and two cutaways for adding a serial port and Econet.

MOUSE/JOYSTICK: The former analogue joystick port has undergone major changes. It's now digital, with a pinout and D type connector compatible with a standard Atari joystick. In effect it's a subset of the previous user port connections. Basic IV's ADVAL command takes these changes into account to maintain upwards compatibility.

PRINTER: The 26 way printer IDC socket has been replaced by a metal shielded, 24 way Delta ribbon socket, the type you see on the back of Epson printers. Acorn have had this forced on them to conform with RFI regulations.

DISC DRIVE: This is a 24 way, D type socket, again metal shielded. You are restricted to two drives only, there being no hardware support for a third drive.

COMPOSITE VIDEO: This uses a standard phono socket, not the bayonet fitting of the rest of the BBC Micro series. It's also strictly monochrome – there's no "fix" that can make it colour.

RGB: The normal Acorn six way DIN socket.

SERIAL PORT: To be made available as a four chip optional upgrade, this is now to RS232 specification, not RS423. In effect, this means the voltages should swing between +–12V as opposed to +–5V. This should not affect the Compact's RS232 talking to an RS423, though.

ECONET: This takes the standard Master upgrade.

On the right hand side of the micro there's an expansion bus, simply an extension of the PCB. Sadly this doesn't provide all the signals of the 65SC12 microprocessor.

However, as an Acorn applications note rather cryptically puts it "a 2 MHz bus is provided by this port as in the Master 128".

As soon as they heard of the Compact, our experts couldn't wait to try it for themselves. Here's what they found.

MIKE COOK

Years ago the BBC had a soap opera by the name of Compact that flopped. I'm sure that Acorn's new product will do better. It's designed to be used by those who are interested in computer software and development, as opposed to those who are interested in computer control.

Many people, especially in education, want a complete package. The Compact offers this, and so enables you to supply your computer requirement from a single source.

Expansion of the Compact is possible, but it is likely to be limited to a second processor or extra ROM sockets.

By keeping the same design philosophy as its predecessors, Acorn has ensured that this is a machine with which many people are already familiar. The widespread use of custom chips and the rationalisation of features result in a micro which can be manufactured at low cost and should be very reliable.

JIM NOTMAN

At last there appears to be a different philosophy in Acorn with this system approach. I like the overall appearance of the separate keyboard but found it rather too spongy, although the positioning of the keys is good.

I welcome the change to 3.5in drives, but if the keyboard is placed immediately in front of the box containing power supply and disc drive it obscures the disc drive. Another niggle: just when I thought that I had enough connectors to plug in anything to a BBC micro or Master, Acorn designs a micro with different connectors.

Although there's not as much software on supplied ROM as in the Master, the disc supplied has a good mix of programs, including ROM images such as View which can be loaded into sideways RAM. This time the Welcome disc really does make you feel welcome.

I like this machine. It should appeal to many who like the Master but don't necessarily need all of its features. The key to the success of Compact will lie heavily on its pricing. I hope that Acorn doesn't price it out of the market.

ROLAND WADDILOVE

On the whole the Compact is an excellent micro and the only cloud on the horizon is the non-standard disc size and filing system.

There is a great deal of 40 track 5.25in disc software around for the BBC Micro which simply cannot be accessed. And the lack of a tape filing system means that tape versions can't be used either.

Fortunately things aren't as gloomy as they might appear. Being an Electron user, most of my programs, utilities and games are on 80 track 3.5in ADFS discs, which work perfectly on the Compact.

It would be an ideal upgrade for Electron owners since you can take your discs, ROMs and software with you. All Basic programs are compatible, and even some Electron software will run quite happily on the Compact.

At the moment there's very little software for the Compact, so if you've just bought one, look around for an Electron user!

The flood of 3.5in disc software that is bound to appear very shortly will benefit both Compact and Electron users.

Ve haf ways of making arrays spill the beans

BEGIN
HERE
Part
10

By PETE BIBBY

FIRST a bit of revision. Last month we met arrays for the first time, so when I ask you to enter:

```
DIM whatever(5)
```

you should know what effect this has on your micro.

In case you don't, the result is that it sets aside space for six numeric variables, each one an element of the array *whatever()*. We say that the DIM statement has dimensioned the array.

These array elements have one thing in common. They all have names that start with a common stem – in this case *whatever*, and end in a number enclosed in brackets.

This number, known as the subscript of that array element, is the bit that enables you and the micro to tell one element from another. So, to sum up:

```
DIM whatever(5)
```

dimensions the array *whatever()*. This consists of six elements *whatever(0)*, *whatever(1)*, and so on, up to *whatever(5)*. Initially all these elements are set to 0 as you'll see if you try:

```
PRINT whatever(0)
```

or:

```
PRINT whatever(3)
```

They don't have to stay like this – you can give each element a value with the usual assignment statements such as:

```
whatever(2)=8
whatever(5)=23.6
```

The subscript – the number in brackets at the end of the element name – is extremely important. As its value changes a different element of the array is indicated.

There's a lot of difference in the values of *whatever(2)* and *whatever(5)* but only the subscript distinguishes the variable names. Apart from the number inside the brackets they're identical.

One important feature of arrays is that you can use a variable as a subscript. Suppose you establish a variable *index* with, say:

```
index=2
```

Now if you ask the micro to:

```
PRINT whatever(index)
```

you'll find that you get the answer 8. Unsurprisingly this is the value of *whatever(2)* – provided you did what I asked above, that is. Similarly:

```
index=5
PRINT whatever(index)
```

will give 23.6.

This ability to use a variable as a subscript is one of the most powerful features of an array, as you'll see if you run Program I.

There's no mystery as to how the program works. The first line just gives it a title, while the second sets aside memory space for an array *number()*, consisting of six elements.

```
10 REM Program I
20 DIM number(5)
30 FOR loop=1 TO 5
40 PRINT "Give me a number"
50 INPUT number(loop)
60 NEXT loop
```

Program I

At first the six elements are given the value 0, but the following FOR. . .NEXT loop allows you to enter values for each element in turn. Well, not quite – it ignores *number(0)*.

The point to grasp is the way that the loop control variable *loop*, is used in line 50. Here the subscript of the array element is *loop*.

The first time round the loop, *loop* is 1 and so whatever value is input is stored in *number(1)*. The second time your response is placed in *number(2)* and so on.

As you'll see this combination of a FOR. . .NEXT loop and an array is very powerful. After all, four lines of code allow us to give values to every element in the array.

And while the array in Program I only has five elements, it could just as easily be 50 or 100, although you'd probably get tired of typing. Still the point is the same – loops and arrays go together to form a useful and dynamic programming technique.

However as it stands Program I isn't all that practical. It just fills an array. Once you've got it what can you do with it? Program II gives you an idea.

The first six lines of the program should provide a sense of déjà vu. Apart from the REM they're the same

→

```
10 REM Program II
20 DIM number(5)
30 FOR loop=1 TO 5
40 PRINT "Give me a number"
50 INPUT number(loop)
60 NEXT loop
70 FOR loop=5 TO 1 STEP -1
80 PRINT number(loop)
90 NEXT loop
```

Program II

From Page 23

as Program I. So the values the user types in at the keyboard are stored in the array *number*.

The next three lines show what can be done with an array once you've got it in memory. What happens is that a second FOR. . .NEXT loop comes into play. This has loop control variable *loop*, but this time *loop* takes values from 5 down to 1, decreasing in steps of 1.

This same variable, *loop*, is used as the subscript of *number()* in line 80. So the first time round the loop, *loop* is 5 and the value of *number(5)* is displayed.

The next cycle has *loop* as 4, and so *number(4)* is shown. This carries on until *loop* is 0 and the loop stops.

The result of all this is that the elements of the array *number()* are displayed in reverse order. So if you'd given the array the values 2, 4, 6, 8 and 10 during the first loop the second one would return 10, 8, 6, 4, and 2.

Notice how the array remembers the order of the data given it. The first number is stored in *number(1)*, the second in *number(2)* and so on.

Also notice how easy it is to manipulate the ordered data using loops and the subscripts of the array. Suppose you wanted every other element of it displayed. All you have to do is change line 70 to:

```
70 FOR loop=1 TO 5 STEP 2
```

which gives you the odd elements while:

```
70 FOR loop=2 TO 5 STEP 2
```

gives the even elements. This may not seem all that valuable at the moment, but as you learn more about programming you'll see how useful it can be.

So far we've only used DIM to create arrays made up of numeric variables, the ones that hold numbers and that we can do sums with.

Readers with inquiring minds may be wondering if we can also have arrays whose elements are string variables. The answer is yes, as Program III shows.

```
10 REM Program III
20 DIM name$(3)
30 FOR loop=1 TO 3
40 PRINT "Give me a name"
50 INPUT name$(loop)
60 NEXT loop
70 FOR loop=3 TO 1 STEP -1
80 PRINT name$(loop)
90 NEXT loop
```

Program III

Here line 20 reserves space for four elements of the array *name$()*. The $ sign at the end of the root of the name tells the micro that each element of the array will be a string variable.

The rest of the program just prompts you for three names as the first FOR. . .NEXT loop cycles. These are held in *name$(1)*, *name$(2)* and *name$(3)* respectively. The final loop simply displays the names in reverse order.

Notice that *name$(0)* isn't used. Now when a numeric array element is set up its value is 0 unless otherwise changed. Can you guess what's the default value held in *name$(0)*?

While Program III may not be the most exciting one in the world it does indicate a use for string arrays. If you had an ordered list of names, say where people came in an exam – then an array is a useful way of holding the information.

Suppose there were 40 people who took the exam and the names are held in the string array *place$()*. It's easy to see how you could dip into it to extract information. To find the name of who came first you'd just enter:

```
PRINT place$(1)
```

while the dunce would be found by:

```
PRINT place$(40)
```

While we're at it, we might also have an array to hold each person's mark. Since the marks are numbers it would make sense to hold them in a numeric array, aptly called *marks()*. Once you'd entered all the data you could whistle up the first person's mark with:

```
PRINT mark(1)
```

and the last one's with:

```
PRINT mark(40)
```

Program IV does just this, using two arrays to store the names and marks of the first three people in an exam.

There's nothing difficult about the program, the only thing that might make you pause is line 20:

```
20 DIM place$(3), mark(3)
```

As you can see from this you can create more than one array with the same DIM. Following this lines 30 to 80 use a FOR. . .NEXT loop to take information from the keyboard and store it in the two arrays.

```
10 REM Program IV
20 DIM place$(3),mark(3)
30 FOR loop=1 TO 3
40 PRINT "Give me a name"
50 INPUT place$(loop)
60 PRINT "Give me "place$(loop)"'s
mark"
70 INPUT mark(loop)
80 NEXT loop
90 PRINT
100 PRINT "Give me a position 1, 2
or 3"
110 INPUT position
120 PRINT place$(position)" got ";m
ark(position)" marks"
```

Program IV

The final part of the program just allows you to interrogate the arrays and learn the name of whoever came first, second or third. Play around with the program and see if you can alter it so that if you give a name, you get the corresponding mark or vice versa.

● *That should keep you busy until next time when we'll be continuing our exploration of arrays.*

PROBLEM

MANY people have upgraded their model B and use Acorn's DNFS and the 6502 second processor. If they now fit the 1770 and ADFS will the system operate satisfactorily?

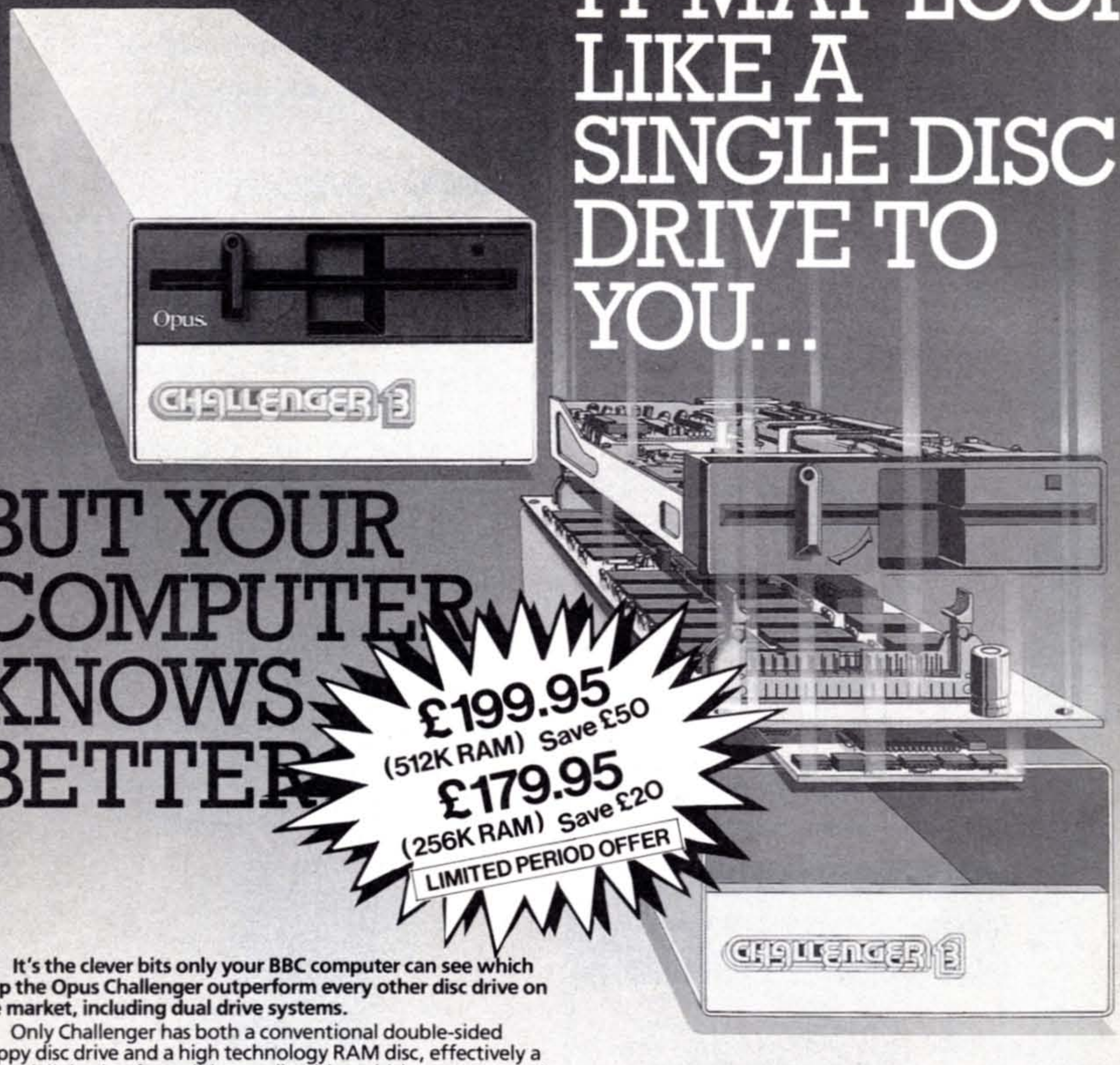
The same applies to the TFS and teletext receiver. In the same vein what about Bitstick1? – L.B. Walshe, Bath.

SOLVED

The main source of incompatability with the 1770 is when software writers directly address the disc controller. This is done mainly for software protection.

If a system uses the correct MOS calls to handle files all will be well. Therefore you are unlikely to have any problem using the second processor, Bitstick or Teletext adapter.

IT MAY LOOK LIKE A SINGLE DISC DRIVE TO YOU...



BUT YOUR COMPUTER KNOWS BETTER

£199.95
(512K RAM) Save £50
£179.95
(256K RAM) Save £20
LIMITED PERIOD OFFER

It's the clever bits only your BBC computer can see which help the Opus Challenger outperform every other disc drive on the market, including dual drive systems.

Only Challenger has both a conventional double-sided floppy disc drive and a high technology RAM disc, effectively a second, lightning fast solid state disc drive which turns your unit into a unique dual system with up to a massive 1.2 Megabytes of useable capacity.

Only Challenger has its own built-in double density disc interface, making all that soldering and track cutting associated with other interface connections, a thing of the past. Just plug-in and away you go.

You'll find more performance than from any dual disc drive system and from only £179.95, Challenger is up to £70 cheaper than even the most inexpensive twin drive and interface package. Unbeatable value and a unique 3-in-1 combination:

- **5¼" DOUBLE-SIDED 40/80 TRACK DISC DRIVE**
- **BUILT-IN DOUBLE DENSITY DISC INTERFACE**
- **INTEGRAL SOLID STATE RAM DISC** Up to 20 times faster than a disc drive and now available in 256K and 512K versions

With all that power and performance you can race through work conventional disc drives labour over and, when you need to save to floppy, the RAM disc backs-up your information in a fraction of the time without any need for tiresome disc swopping. A & B Computing, which voted Challenger "Best buy of the year", said: "Using the RAM disc is a real dream... We checked a document just over 21K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc".

You don't even need to worry about compatibility. We've fitted the same disc controller chip used on the BBC B+ to make Challenger compatible with all leading software titles and it's suitable for use with the new 128 Master Series.

Challenger's price even includes VAT, FREE 72-hour delivery, the unbeatable Opus two-year warranty and a full operating manual.

So call us now on 0737 65080 for details of our nationwide dealer network or simply post the coupon. Generous education and dealer discounts available.

CHALLENGER – SIMPLY LIGHT YEARS AHEAD OF THE OPPOSITION

To: Opus Supplies Limited, 55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.
Please rush me the following: (PRICES INCLUDE VAT AND CARRIAGE)
________ Challenger Unit(s) £179.95 each including 256K RAM disc
________ Challenger Unit(s) £199.95 each including 512K RAM disc
I enclose a cheque for £ ________ or please debit my credit card account with the amount of £ ________
My Access ☐ Visa ☐ no. is: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
NAME ________
ADDRESS ________
____
TELEPHONE ________

Opus.

SOLIDISK SUMMER SPECIAL OFFERS

£40.00 Cash Allowance for your old ROM Expansion Board when you trade in for the Fourmeg 256K

or £10.00 reduction if you already have Solidisk DFS

The memory limit on the BBC Micro can now definitely be a thing of the past. The new Solidisk Fourmeg 256 board offers all you could wish for.

It has 256K of extra RAM, a superfast 4MHz CMOS processor, sophisticated memory management, sockets for high capacity ROMs and 48K of software in ROM.

In fact, it contains even more devices than the BBC itself. It is compatible with most hardware add-ons — except Sideways ROM expansion, which explains why this special offer.

Fitting it is easy. You remove the existing processor from its socket and plug the new board in its place, push on three colour-coded wires, clip on two mini-hooks and it's ready. Switch on the computer and you will immediately see the difference.

The message "Solidisk 256K expansion (4MHz)" announces the new memory size and speed.

A switch at the back lets you select between the old (2MHz) and the new (4MHz) speed.

The BBC Micro at 4MHz easily surpasses the new MASTER 128K on benchmarks.

For example, it runs the benchmark using Basic 4 in only half the time taken on the MASTER 128K.

If you have too many ROMs to plug in at once, the Fourmeg 256 offers TWO ways out. First, it includes additional high capacity (and fast) ROM sockets. Moreover, two or four normal ROM images can be stored in one high capacity ROM chip (by "Vertical Paging") — so more can be made immediately available at your fingertips.

Secondly, ROM images can be stored on discs and loaded into any one of the eight Sideways RAM banks available.

If you need more room in "languages" such as VIEW or BASIC, you may use any of the eight SHADOW RAM banks. No user memory is then lost to the screen, whatever the screen mode (while machine coded programs can access RAM right up to &FC00!).

Two frequent uses of the extra memory are as a RAMDISK or a printer buffer.

Star commands in the ROM can turn the extra RAM into a silicon DISK of 200K, compatible with both the Solidisk DFS and ADFS formats. The RAMDISK is at least 10 times faster than physical disc drives as it has no moving parts.

The printer buffer saves you time, it lets you use the computer while feeding your printer in the background.

In addition, the MANAGER ROM offers over 30 star command utilities to save time and effort using the computer.

To complement such a powerful product, Solidisk has arranged with Computer Concepts to bundle the famous WORDWISE PLUS wordprocessor ROM and manuals. This excellent product, worth £45.00 on its own, became the best selling wordprocessor for the BBC computer last year.

All in all, the Solidisk Fourmeg 256 offers an unmatched combination of speed, power and built-in facilities, while still having room for even further expansion. It is the most logical next step for the owners of any Sideways ROM board or of Solidisk Sideways RAM, who can trade in their present boards for the excellent Fourmeg 256.

Yes! I want to take you up on your special summer offer

"I will pay only: (delete if not applicable)

☑ **£135.00 instead of the normal price (175), I will send you my old ROM board when I have been satisfied with your Fourmeg 256.**

☑ **£165.00 instead of the normal price, I already have your DFS installed in my BBC.**

☑ **I also allow £3.00 for First Class Post.**

If for any reason I am not entirely satisfied with your product, I will return it before 15 days and have all my money back (except postage if applicable)".

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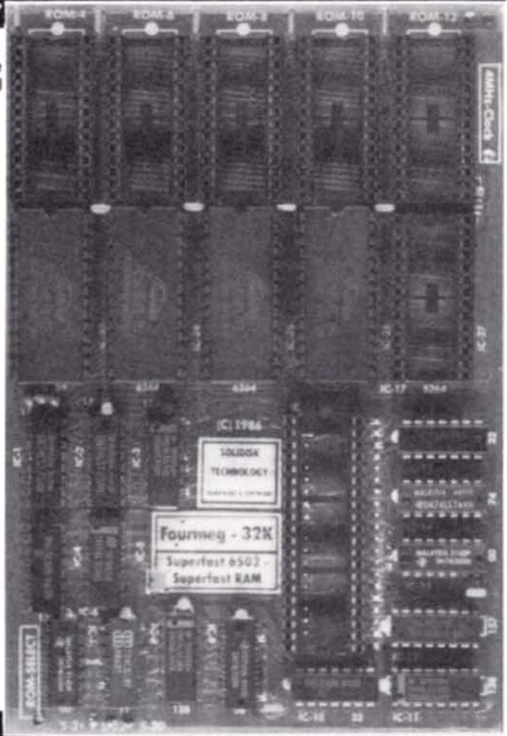
ASK FOR A BROCHURE

SOLIDISK NEW DEVELOPMENTS

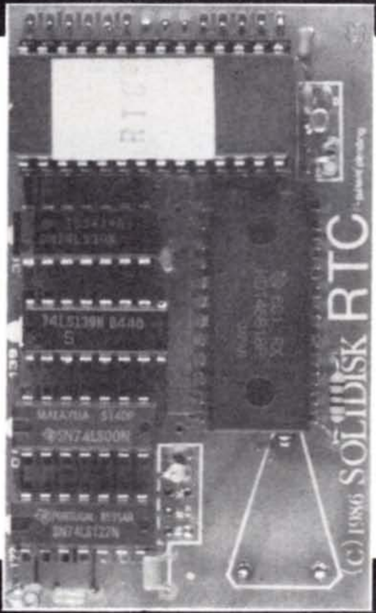
Shadow, Sideways ROM and Sideways RAM All-In-One for £50:



This board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).
The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.
The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.
The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.
When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).
The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.
The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

TWOMEG-32K	£50.00
65C02 (2MHz) for the above	£10.00
Or upgrade to FOURMEG	£25.00
FOURMEG-32K	£70.00

Real Time Clock & Desk:



The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.
The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.
Apart from giving the Time and Date, through *TIME or TIME$ (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.
Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, bleep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.
You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).
The Real Time Clock will add fun and convenience to the every day use of your BEEB.

Order as CLOCK	£29.00

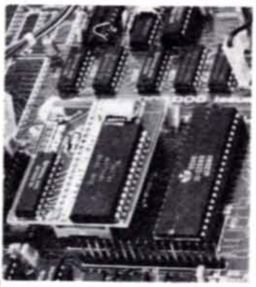
In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

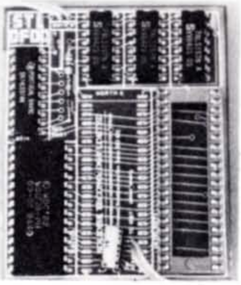
SOLIDISK BUDGET DISC SYSTEMS

Double density disc interface



Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3½" and 5¼", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM .... £35.00 (order as XR/DDFS)

1770+8271, dual floppy disc controller interface



Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM .... £40.00 (order as XR/DFDC)

Low cost 3 ½ inch disc drives

The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and ¼ drives make them irresistable. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee.

Order as 3.5 INCH-DRIVE (80 track/Double-sided) £90.00

FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00. Order as 3.5/PSU.

Special leads

A Special set of leads to connect TWO drives in ANY combination of 5¼ and 3½ drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

Advanced disc filing system ROM-set (two 16k EPROMS) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.

Normally £30.00 but if order with DDFS or DFDC only £20.00

Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.

Single and double density disc filing system ROM version 2.2

The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc... Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.

Normally £15.00 but if order with DDFS or DFDC only £10.00

Please mention computer model when ordering. Order as ROM2.2.

Unbeatable quality 5 and ¼ inch disc drives

Also available are NEC or MITSUBISHI 5 and ¼ inch, 80 track, double-sided drives at a very attractive price. Cased in matching cream colour, all leads. Only £109.00

Free bridge unit for twin drive systems

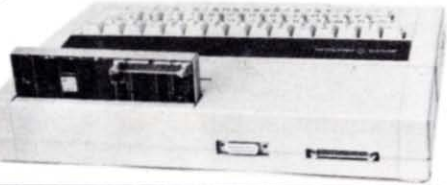
If you pay for two drives on a single order, we will offer you, absolutely FREE this practical BRIDGE unit. Solid steel construction, suitable for all Models of BBC and Master 128K.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb. The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3. The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only: .... £50.00.

Use a disc system with built-in power supply unit.



Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and inumerable other uses as supported by a library of 15 software diskettes.

The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.

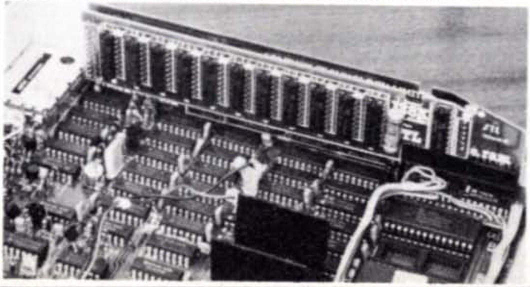
This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of ONLY £20.00 for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.

Order as SWR32 .... £20.00
Order as SWR128 (SWR32 with 96K extension) . £50.00

NB: Manual supplied but software (not strictly required) not included.

The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.

Order as VOL. XX £2.00
Order as SOFT/PACK 1 or 2 or 3 .... £10.00



Secondhand Refurbished Beebs:

As a result of the Solidisk MASTERPLAN, we have to dispose regularly of SECONDHAND, refurbished, complete with Double Density DISC INTERFACE, thoroughly checked and fully guaranteed (Labour only) BBC Model B's. Price vary with issues and ages, commencing from £150.00. Please ring for brochure.

In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745.00, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

Order Form

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ESS has been devised and launched by Linear Graphics in order to provide the educational environment with the best possible value for money when purchasing this highly versatile extension to their computer graphics systems.

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EDUCATION MICRO USER

Econet or not – the network question

Philip Andrews looks at the alternative

ACORN has always been keen to promote the Econet network system. Many teachers view it almost as the ultimate system to have in the school, being the answer to all problems. But is Econet all that Acorn have tried to make out, or is it a millstone that is going to hamper the integration of computers into the classroom environment?

Acorn has just produced a glossy brochure promoting the Econet saying: "It is reliable, economic, versatile, powerful and expandable." To judge the validity of this claim compare a 10 station Econet system to a similar school with 10 discrete computer systems each with its own disc drive and printer and weigh up the advantages and disadvantages of each.

Acorn claims that Econet is reliable. If one of the disc drives on the non-Econet system breaks down one computer system is put out of action. However you can use one disc drive between two machines while the faulty one is repaired. Some loss to the school, but mostly inconvenience caused. On the other hand if one of the key components on the Econet system breaks down the whole system will be out of action. You have all your eggs in one basket. Several parts could cause the whole system to fail, the hard disc, the 800k disc drive, the Master with Turbo or 6502 second processor, the clock box, the terminators or the networking cable. You must also consider failure of the printer. Quite a lot of eggs to have in one basket!

Acorn claims that Econet is economic. Let's weigh up the costs of our alternative approaches. With the Econet system we will need an extra machine for the file server. Monitors are not included because both systems require the same (except for the extra file server monitor). These are the best advertised prices at the time of writing. They should, of course, only be taken as a rough guide.

ECONET SYSTEM	
Master 128 with Turbo and Econet	£550
Green-screen monitor	£75
Level 3 software plus 10 mb disc	£1108
Printer	£145
Print server	£42
Cables and so on	£475
10 Master ET	£3200
800k disc drive	£225
Total:	*£5820*

DISCRETE SYSTEMS	
Master 128	£385
100k disc drive	£75
Printer	£145
Total:	£605
Total for 10 machines:	*£6050*

Looking at the above then Acorn is right, a 10 station Econet is more economic than 10 discrete systems. Just. Ever since Econet was first introduced the number of machines has been the break point, even though the various prices have changed. However there is one factor missing from the equation, installation costs. These can prove to be quite expensive and will overshadow the slight saving made. Clearly though, adding more machines could prove cheaper on the Econet system.

In the above equation a printer has been allowed for each of the discrete machines. Some savings could be made here, for instance one printer per two machines. The saving in cost would be £725. Also you should consider that for the networked system a more robust printer would be required to handle all the work. This would add at least another £150.

The next claim is versatility. I believe that this is one of the greatest drawbacks of the Econet system. It is a sad fact of life that the only opportunity that most teachers have to

→

Design challenge

FOUR new BBC Micro and Master titles have been added to Academic Software's list of craft, design and technology and home economics software.

All four packages have been developed by multi-disciplinary teams of advisers, teachers and computer specialists supported by curriculum development funds from MEP, and have undergone extensive trials in West and North Yorkshire.

Central theme of **Boat Hull Design** is to provide students with a realistic design-based technological problem, enabling them to develop an understanding of designing and making within the constraints of a given problem.

The student is stranded on an island and in order to escape has to identify trees from their leaves and test their timber for suitability as material for a home-made boat.

A trial hull is eventually made and tested for performance in a flow tank using apparatus described in the documentation. Kits of necessary timber and parts are available.

Human Digestion employs colourful and instructive graphic

→

The new BBC micro allows your child a bit of growing room.

Ample room to accommodate your child's learning development.

The BBC Master Compact's educational software, takes children from their first grasp of words and numbers to A-level and beyond.

In 84% of U.K. schools, children are already growing up with BBC micros.

With a BBC Master Compact at home, your child's ability with computers will progress by leaps and bounds.

Before too long, you may find that you have a Businessman of the Year in the family. At which stage, our micro could well be handling your young tycoon's financial planning and forecasting.

Accountancy Age has already acclaimed our spreadsheet package* as 'the most sophisticated yet produced for a small micro'.

The BBC Master Compact manages to fit the BBC micro's benefits into one, easy to use package. This includes colour monitor, processor, disc drive and enough software to keep you and your children busy indefinitely.

It is now available from selected branches of Currys, Dixons, John Lewis*, Laskys, W. H. Smith and your Acorn dealer.

You owe it to yourself to buy them something they won't grow out of easily.

THE MASTER COMPACT 128K RAM, 3.5" DISC DRIVE, PRINTER AND JOYSTICK INTERFACE. SOFTWARE INCLUDES VIEW WORD PROCESSOR, ABC, CARD INDEX, LOGOTRON LOGO, WINDOW DRIVEN DESKTOP SYSTEM, ADVANCED DISC FILING SYSTEM, 14 PROGRAM WELCOME PACK AND 4 TUTORIALS. *SPREADSHEET EXTRA AT £52. BASIC PRICE £399 WITH MONOCHROME MONITOR £469 WITH HIGH RESOLUTION (0.42 PITCH) COLOUR MONITOR (AS ABOVE) £599. ALL PRICES PLUS VAT. FULL DETAILS FROM BOB COATES, DEPT (**MU1**), ACORN COMPUTERS LTD., CAMBRIDGE TECHNOPARK, 645 NEWMARKET ROAD, CAMBRIDGE CB5 8PD.

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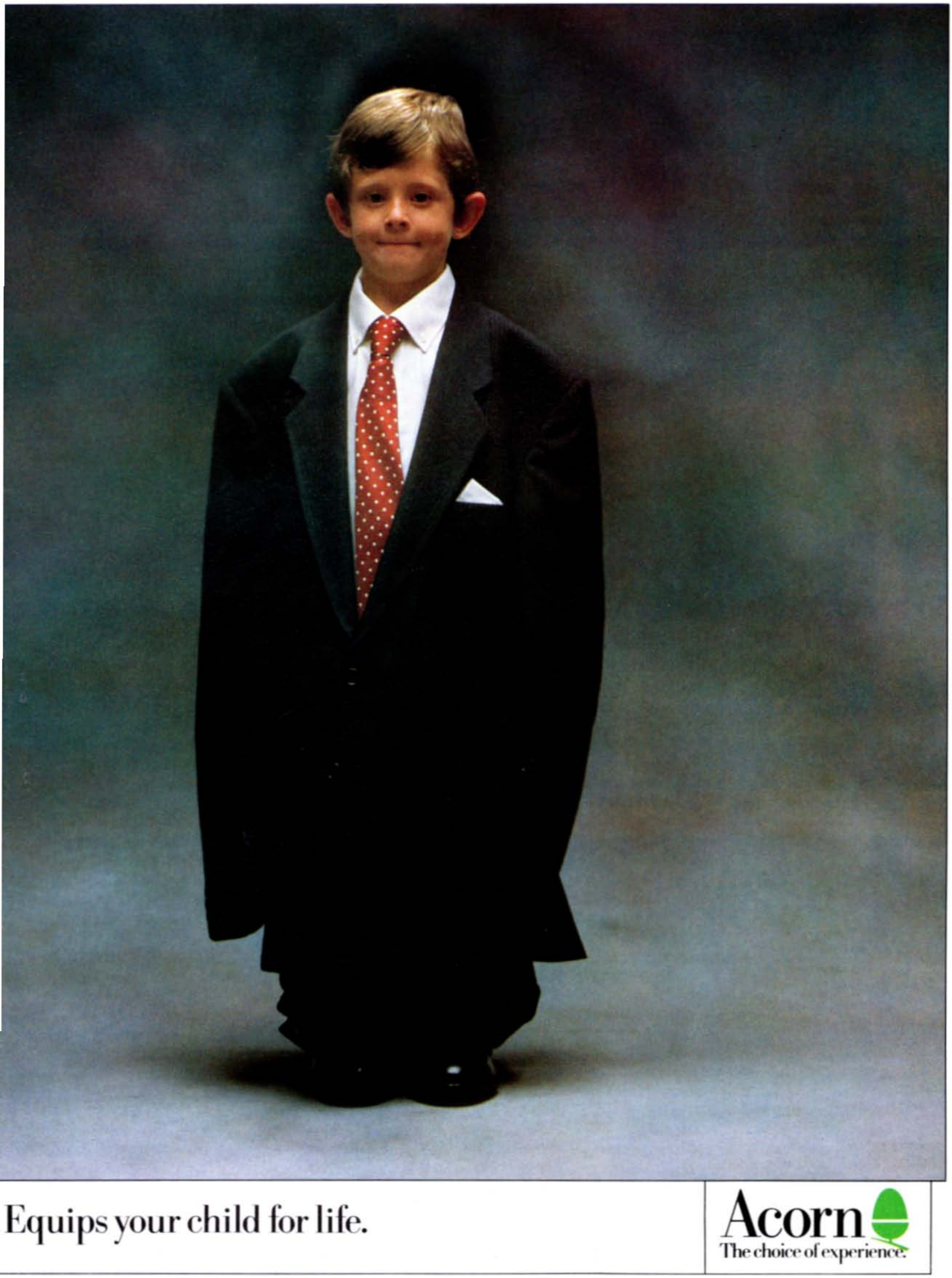
The BBC Master Compact.

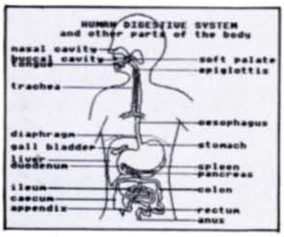

Equips your child for life.
Acorn
The choice of experience.

simulations of digestion, with full textual description and reinforcement exercise.

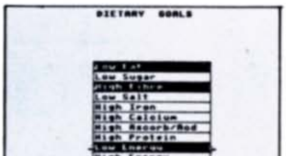
The simulations of digestion and absorption use notional block diagrams of the human body, on which the food being digested and absorbed is shown as a train of coloured boxes, each colour representing one of the seven major nutrient groups.

The appropriate enzymes for carbohydrates, proteins and fats are displayed as "scissors" which cut up the nutrients into successively smaller boxes showing the vitamins and minerals passing through the walls of the ileum or colon.

The absorption sequence shows the passage of these nutrients via the liver or lacteals to the bloodstream and through the heart, picking up oxygen in the lungs and dispersing it into the whole body.



The more advanced treatment of digestion by nutrient hydrolysis shows a cheese sandwich as a group of colour-coded symbols, each representing one of the the major nutrient groups.



```
51 RECIPES                    AFTER TEST 1
Are recipes to include marked items ?
DELETE=no,COPY=yes(all),RETURN=yes(any)
```

As the nutrients pass through the digestive tract the enzymes are seen to act on the relevant nutrients. An alternate process of dynamic action play and textual description allows the material to be assimilated easily by the student, while the repetitive stages can be bypassed.

Boat Hull Design and Human Digestion cost £31.95 each (£19.95 to UK educational establishments).

Compleat Meal Planner stimulates problem-solving

Getting started on Econet: All the components needed to start up your network of micros are supplied in kit form. A main cable runs the length of the network with a terminator box at each end. The clock box is sited in the middle while each workstation is connected by a socket box.

From Page 31

learn about the computer or its associated software is to take the kit home in the evening, at weekends, or during holidays. (How many industries or businesses would expect that?)

How do you take a computer home that is part of an Econet system? The only way is to have several computers with their own disc interface and disc drive. Then there is the problem of the software that is now on the hard disc.

Another problem occurs with classroom organisation. The Econet system is ideally suited to one computer per room. But what happens when the school wants a more flexible approach, so that a particular class has most or all of the school machines for just two weeks for example?

This appears a strange way of organising the computer, but has much to commend it. It means that a class can gain the maximum benefit for the period required, and not be in a situation that the computer is there, therefore it must be used. A project, for instance, would benefit from this approach. Discrete machines allow a great flexibility of organisation that networked machines do not.

A network is powerful. Yes it is, it has a tremendous potential as, say, an interactive system, whereby each station can be operating a different part of an interactive program. However there is little software that uses this. The vast majority has been developed for discrete machines, hence the power of the network in the classroom is not exploited to its full potential.

The costings allowed for a 10 mb hard disc. This is actually not a great deal of storage, being equivalent to 100 normal 100k disc drives, or equivalent to only 16 floppy discs when using the ADFS available on the Master. A hard disc can soon become cluttered up with unwanted files, especially if the children are using a word processor or a database.

Expandable? Of course it is, but it is just as easy to buy another discrete machine. With cable at £1 per metre expanding a network system can prove costly.

Of the other problems with Econet the major one is software. Where are all the programs in Econet versions? Many software houses are now feeling the pinch, having made far less out of educational software than they had hoped. They claim that there is little market for Econet software, and are thus not prepared to commit the resources to making Econet versions. What software there is for Econet is usually much more expensive.

Where does one stand with copyright on a network system? As yet no one knows; that is, until the law is tested in court. Then an adverse judgement could have a detrimental impact on the use of networks.

Another problem is that there must be someone in the school with responsibility for the system. He or she must start up the system each day, will need to make backups of files on to floppy disc, put new software on to the network, and generally police the system. This requires someone with the good level of programming skills needed to put software on to the network.

Often this person assumes the status of the dragon sitting on the pot of gold. He becomes an essential part of the system – without him the network is an expensive dinosaur. Often he spends hours playing around with the system, designing new menus and passwords, spending less and less time doing what he's paid for, teaching. And what happens if this teacher is ill or leaves?

Then there's the printer. A print server is fine if all the machines are in one room, but when they are placed around the school, you can end up with quite a walk to see a printout. If the printer is in frequent use you might have to wait for a printout. With several using the same machine problems can occur with the printer not being reset at the end of each printout.

I asked one teacher with the responsibility for running an Econet system what he thought of it. "It's great", he said, "I have got away from having to make copies of all those separate discs." This does not say much for the advantages of networks. Far better that each teacher has responsibility for his own system with someone in the school to coordinate his efforts.

I remain a sceptic, not convinced by Acorn's advertising, but with a gut feeling that perhaps Econet is doing more harm than good. Certainly there is growing evidence to show that the spread of computers across the curriculum is restricted by having all the machines networked, especially if they are all in one room. In the light of these arguments, my feeling is that few if any of Acorn's claims for Econet hold water in the average school.

Coloured Lights Lesson

Rog Frost helps cast light on GCOL

THIS educational program grew out of my doodlings with the graphics colour command GCOL. Most people probably know that GCOL has two parameters, of which the second actually defines the colour. The first parameter may, however, be a bit of a mystery even if you've read articles attempting to explain all about its purpose.

There's no alternative to trying things out if you really want to know about them. That's what I did with GCOL. I selected Mode 2 and then an area of red using GCOL1,1. I overlapped the red with an area of green using GCOL1,2. The overlapping section came out yellow.

At this point the physics teacher in me came to the surface. Red and green are primary colours of light and yellow is the secondary colour produced by mixing the two. Further research quickly revealed that any two primary colours that overlapped using GCOL1 produced the correct secondary colour. Here was the basis for a program to demonstrate coloured light addition.

However, more investigations, this time with GCOL2, produced the effects of shining light through more than one colour filter. This developed into the colour subtraction part of the program. So if you're mystified by the GCOL statement, this could be the program for you. Remember, the best way to learn about something is to actually do it.

Having decided to write a program aimed at children (or at any rate teenagers) it was necessary to make it robust. Youngsters are notoriously careless at the computer, so the keyboard auto repeat is cancelled (*FX11,0) and the buffer is flushed before each expected input (*FX15,0). The Escape key is completely disabled (*FX229,1).

Another habit of teenagers is to enter unlikely names. Names such as "Snurt" or "Henry 4" abound on games high-score tables. It would be impossible to make sure that people were entering their real names, but lines 1940 to 1970 make sure that only sensible characters appear in the name.

Names are not entered merely so that the computer can give polite responses. The program incorporates a short test on coloured lights and each person's score in the test is stored. These scores are automatically displayed after 30 people have used the program. They can be accessed at any time by selecting the question option and entering the name SCORE. To return to the menu it is then necessary to press the spacebar.

The program as it stands is too long to run on disc-based systems without some form of downloader. Lines 40 and 2240 to 2260 regain the memory used by disc-operating systems and allow the program to run. Pressing Break will result in a Bad Program message on such systems and is the one key to be avoided.

This program has been in use by my pupils for some time and has proved a very useful teaching and revision aid.

PROCEDURES

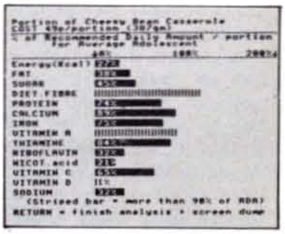
init	Dimensions arrays, sets the variables and defines the characters used.
menu	Displays the program control menu and allows people to move to any part of the program.
primary	Displays the three primary colours, red, blue and green.
coladd	Deals with colour addition.
comp	Handles the complementary colours.
colsub	Deals with colour subtraction.
ques	Displays the questions and accepts the answers.
score	Prints out a record of all scores.
name	Names of participants are entered here.

---

project work in meal selection, nutrition and dietary analysis supported by extensive databanks of hundreds of multicultural foods and recipes.

Recipes matching personal and professional criteria can be browsed through on the screen, so that aspects such as equipment, oven temperatures and ingredients can be checked.

Icons are used to display information in concentrated graphic form and chosen recipes can be analysed to see if they meet dietary goals and recommended daily amounts for various types of people.



Three extension modules are available which offer more sophisticated problem-solving exercises. Compleat Meal Planner costs £31.95 (£19.95 to UK educational establishments). Each extension module costs £7.95 (£4.95) and the full package £49.95 (£31.95).

Kitchen Planner shows 3D as well as plan and elevation views of variously shaped kitchens during the design phase, allowing students to place essential and optional units.

By evaluating the final plans for safety, hygiene and efficiency in a range of kitchen tasks the program teaches the fundamentals of space planning in an interactive mode.

Kitchens can be planned in four basic layouts, U-shaped, L-shaped, double line and single line, and while units are being placed the floor plan and three wall elevations are displayed.

For efficiency evaluations, the position of crockery and food storage is described on the wall elevations and the plan is then analysed for three standard tasks to derive an efficiency percentage.

Together with safety and hygiene checks, this percentage figure is displayed and the student given the option to improve or accept the design.

Kitchen Planner costs £24.95 (£14.95 to UK educational establishments).

More questions?

OUR Any Questions feature last month has produced many requests for more sets of questions.

We already have several sets prepared and intend to put two sets of 20 questions on future monthly tapes and discs.

You will find 20 questions on computer studies and another 20 on music on the October tapes and discs.

We know many teachers have been preparing sets of questions ready for the next school year, so if you have any tests prepared that you would like to share with your colleagues please send them on disc or tape (which we will return) to Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

School banking

TEACHER Mike Cannon spends half an hour a week supervising financial transactions at a bank – but he doesn't have to travel very far from his blackboard to do it.

Levenshulme High School in Manchester, where Mike is head of mathematics, is one of more than 700 schools in England and Wales which have set up their own banking facilities with help from the Midland Bank.

About 200 of Levenshulme High's 750 pupils use the school bank to save for presents, school trips and holidays.

Like other mini banks under the scheme, it operates on a disc-driven BBC Micro system using sophisticated software specially written for the Midland by R.R. Microtech of Quorn, Leicestershire.

Fifth formers undergo realistic job interviews before being selected to act as cashiers, ledger clerks and managers.

As well as acquiring keyboard skills and experience of financial transactions, these youngsters are in many cases preparing for a career in banking.

School leavers who have earned a "school banker" certificate are virtually guar-

→

Coloured Lights listing

From Page 35

```
   10 REM COLOURED LIGHTS LESSON
   20 REM By Rog Frost
   30 REM (C) The Micro User
   40 IF PAGE>&E00 GOSUB2250:REM This
 calls down loader for disc systems
   50 MODE2
   60 *FX11,0
   70 *FX229,1
   80 VDU23;8202;0;0;0;
   90 PROCinit
  100 PROCmenu
  110 DEFPROCprimary:COLOUR128:CLS
  120 COLOUR131:COLOUR4:PRINT'"The th
ree primary"'"colours are:-    "
  130 PROCCIRCLE(300,700,100,1,1):PRI
NTTAB(11,6);SPC(5)TAB(11,7)" RED "TAB
(11,8);SPC(5)
  140 PROCCIRCLE(300,500,100,2,1):PRI
NTTAB(11,13);SPC(7)TAB(11,14)" GREEN
"TAB(11,15);SPC(7)
  150 PROCCIRCLE(300,300,100,4,1):PRI
NTTAB(11,20);SPC(6)TAB(11,21)" BLUE "
TAB(11,22);SPC(6)
  160 PRINTTAB(3,27);SPC(13)TAB(3,28)
" PRESS SPACE "TAB(3,29);SPC(13)
  170 *FX15,0
  180 REPEAT UNTIL GET=32
  190 IF flag=0 PROCmenu ELSE PROCcol
add
  200 ENDPROC
  210 DEFPROCcoladd
  220 COLOUR3:COLOUR128:CLS
  230 VDU28,1,30,19,0
  240 PRINT''''"COLOUR ADDITION"''''
"Two or more lights"''"shining togeth
er.":TIME=0:REPEAT UNTIL TIME>500:CLS
  250 VDU28,0,31,19,25
  260 PROCCIRCLE(500,550,250,1,1)
  270 PROCCIRCLE(700,550,250,2,1)
  280 PROCCIRCLE(600,750,250,4,1)
  290 COLOUR135:CLS
  300 COLOUR4:PRINT"When two primary"
'"colours are mixed"'"a secondary col
our"'"is seen."''"PRESS SPACE"
  310 *FX15,0
  320 REPEAT UNTIL GET=32:CLS
  330 PRINT"Red and green give"'"yell
ow. Red and"'"blue give magenta."'"Bl
ue and green give"'"cyan."'"PRESS SPA
CE"
  340 *FX15,0
  350 REPEAT UNTIL GET=32:CLS
  360 PRINT"If all three of the prima
ry colours mix then white is made."''
"PRESS SPACE"
  370 *FX15,0
  380 REPEAT UNTILGET=32:CLS:CLG
  390 VDU26
  400 IF flag=0 PROCmenu ELSE PROCcom
p
  410 ENDPROC
  420 DEFPROCcomp
  430 COLOUR135:CLS
  440 COLOUR4
  450 PRINT'''"COMPLEMENTARY COLOUR"'
'SPC(6);"MIXING"
  460 TIME=0:REPEATUNTILTIME>500:COLO
UR128:CLS
  470 VDU28,0,31,19,20
  480 COLOUR135:CLS:COLOUR1
  490 PRINT"Colours are said to be co
mplementary if they make white whenmi
xed."
  500 PROCCIRCLE(400,700,250,1,1)
  510 PROCCIRCLE(800,700,250,6,1)
  520 *FX15,0
  530 PRINT''"PRESS SPACE":REPEAT UNT
IL GET=32:CLS
  540 PRINT"Red and cyan are"'"comple
mentary to"'"each other."
  550 PRINT''"PRESS SPACE"
  560 *FX15,0
  570 REPEAT UNTIL GET=32:GCOL0,128:C
LG:CLS
  580 PROCCIRCLE(800,700,250,3,1)
  590 PROCCIRCLE(400,700,250,4,1)
  600 PRINT"Yellow is made by"'"mixin
g red and greenso adding blue to"'"ye
llow means that"'"all three primary"'
"colours are mixed"'"here."
  610 PRINT''"PRESS SPACE"
  620 *FX15,0
  630 REPEAT UNTIL GET=32:VDU26:COLOU
R128:CLS
  640 IF flag=0 PROCmenu ELSE PROCcol
sub
  650 ENDPROC
  660 DEFPROCcolsub
  670 COLOUR135:CLS:COLOUR4
  680 VDU28,1,30,19,0
  690 PRINT''"COLOUR SUBTRACTION"'''"
Here white light"''"is shining out"''
"through colour"''"filters which"''"o
verlap."
  700 TIME=0:REPEATUNTILTIME>500:CLS
  710 VDU28,0,31,19,25
  720 GCOL0,135
  730 PROCCIRCLE(500,550,250,1,2)
  740 PROCCIRCLE(700,550,250,2,2)
  750 PROCCIRCLE(600,750,250,4,2)
  760 PRINT"If primary colours  overl
ap then no"'"light gets out."
  770 PRINT'"PRESS SPACE"
  780 *FX15,0
  790 REPEAT UNTIL GET=32:CLS:CLG
  800 PROCCIRCLE(500,550,250,3,2)
  810 PROCCIRCLE(700,550,250,5,2)
  820 PROCCIRCLE(600,750,250,6,2)
  830 PRINT"If two secondary"'"colour
s overlap, thecommon primary lightshi
nes through."
  840 PRINT'"PRESS SPACE"
  850 *FX15,0
  860 REPEAT UNTIL GET=32:CLS
  870 PRINT"If all three coloursoverl
ap then no"'"light can get out."
  880 PRINT'"PRESS SPACE"
  890 *FX15,0
  900 REPEAT UNTIL GET=32:CLS
  910 PRINT"When coloured light shine
s on objects"'"the effects are"'"simi
lar to this."
  920 PRINT'"PRESS SPACE"
  930 *FX15,0
  940 REPEAT UNTILGET=32:VDU26:COLOUR
128:CLS
  950 IF flag=0 PROCmenu ELSE PROCque
s
  960 ENDPROC
  970 DEFPROCques
  980 COLOUR3:COLOUR128:CLS
  990 PRINT''''"   QUESTION TIME":TIM
E=0:REPEAT UNTIL TIME>500:CLS
 1000 VDU28,0,31,19,26
 1010 FOR C%=1 TO 6:COLOUR C%
 1020 PRINTTAB(C%*3,1)+CHR$255 TAB(C%
*3,3);C%
 1030 NEXT
 1040 COLOUR7
 1050 PRINTTAB(0,1)CHR$254 TAB(0,3)"0
"
 1060 VDU28,0,26,19,20
 1070 VDU24,0;400;1279;1023;
 1080 col%=RND(6)
 1090 PROCCIRCLE(400,700,300,col%,1)
 1100 PRINTTAB(0,0)"What is the"'"com
plement of the"'"colour shown? ";
 1110 *FX15,0
 1120 ans%=GET:IF ans%<48 OR ans%>54
THEN 1100
 1130 ans%=ans%-48
 1140 PRINT;ans%
 1150 IF col%+ans%=7 PROCCIRCLE(800,7
00,300,ans%,1)
 1160 CLS
 1170 IF col%+ans%=7 PRINT"WELL DONE
";name$(n%):score%(n%)=score%(n%)+1 E
LSE PRINT"WRONG. CORRECT"'"COLOUR WAS
 ";7-col%
 1180 PRINT'"PRESS SPACE"
 1190 *FX15,0
 1200 REPEAT UNTILGET=32:CLS:GCOL0,13
5:CLG
 1210 PROCCIRCLE(400,700,300,5,2)
 1220 PRINT"If magenta light"'"shines
 through a"'"yellow filter, what"'"co
lour will be seen? ";
 1230 *FX15,0
 1240 ans%=GET:IF ans%<48 OR ans%>54
THEN1230
 1250 ans%=ans%-48
 1260 PRINT;ans%
 1270 PROCCIRCLE(800,700,300,3,2)
 1280 CLS:IF ans%=1 PRINT"WELL DONE "
name$(n%):score%(n%)=score%(n%)+1 ELS
E PRINT"WRONG"
 1290 PRINT''"PRESS SPACE"
 1300 *FX15,0
 1310 REPEAT UNTILGET=32:CLS:CLG
 1320 VDU5:GCOL0,6:MOVE370,700:PRINT;
eleph$:VDU4
 1330 PRINT"This elephant is to be li
t with yellow"'"light. What colour"'"
will she be? ";
 1340 *FX15,0
 1350 ans%=GET:IF ans%<48 OR ans%>54
THEN1340
 1360 ans%=ans%-48:PRINT;ans%
 1370 PROCCIRCLE(400,700,300,3,2)
 1380 CLS:IF ans%=2 PRINT"WELL DONE "
;name$(n%):score%(n%)=score%(n%)+1 EL
SE PRINT"WRONG"
 1390 PRINT'"PRESS SPACE":REPEAT UNTI
L GET=32:CLS:CLG
 1400 *FX15,0
 1410 VDU5:GCOL0,1:MOVE370,700:PRINT;
eleph$:VDU4
 1420 PRINT"This elephant is to be li
t with green"'"light. What colour"'"w
ill she be? ";
 1430 *FX15,0
 1440 ans%=GET:IF ans%<48 OR ans%>54
THEN1430
 1450 ans%=ans%-48:PRINT;ans%
 1460 PROCCIRCLE(400,700,300,2,2)
 1470 CLS:IF ans%=0 PRINT"WELL DONE "
;name$(n%):score%(n%)=score%(n%)+1 EL
SE PRINT"WRONG"
 1480 PRINT'"PRESS SPACE"
 1490 *FX15,0
 1500 REPEAT UNTILGET=32:CLS:CLG
 1510 VDU5:GCOL0,3:MOVE340,670:PRINT;
eleph$:VDU4
 1520 PRINT"This elephant is to be li
t with blue"'"light. What colour"'"wi
ll he be? ";
 1530 *FX15,0
 1540 ans%=GET:IF ans%<48 OR ans%>54
THEN1530
```

anteed YTS work experience at a Midland Bank branch. A Midland spokesman told *The Micro User* that most "school bankers" are taken on as permanent staff before their YTS period ends.

Schools receive the BBC Micro software necessary to start their own bank free of charge. In addition they get continuing advice from Midland Bank personnel, a full range of stationery, badges, posters, rubber stamps and ink pads – and a donation is made by the Midland to school funds.

Pupils are issued with cheque books and paying-in books, and accounts are opened for them at their local Midland branch, where interest on savings is calculated and applied.

With a minimum deposit of 50p pupils get a geometry kit. If they save £10 they receive a sports bag filled with useful items.

Each pupil is allocated a three digit account number and the Microtech software – which cost £10,000 to develop – records all deposits and withdrawals and can print out individual bank statements and balances. "Educationally the school bank has been a very good thing", says Mike Cannon. "Apart from giving youngsters VDU experience and teaching them to handle money, it can lead to careers in banking and commerce".

Schools interested in joining the scheme should contact their local branch of the Midland Bank.

Password problem

THE sudden death of an Econet system organiser has emphasised a major problem which can occur when network passwords are held by a single individual.

A school in Auckland, New Zealand, wrote to *The Micro User* for help when the man setting up its Econet disc filing system for 15 BBC Micro stations died before he had completed the job of adapting important software, including utilities and languages, to the network.

"As nobody was able to obtain his password before his death I am unable to access any of his files and complete the Econet system", wrote the teacher appointed to take over as network manager.

"I would greatly appreciate it if you could assist me in any way so that many projects already saved through the network on discs by students would not be lost".

Fortunately the backroom team at Acorn was able to rescue the school from its predicament.

Econet specialist Alastair France said: "Luckily the school had a Level 2 file server and not Level 3, which is much harder to get into.

"We have been able to advise the school how to set up a new password file.

"I wouldn't want to give away any trade secrets, but basically with a correctly programmed new disc in drive 0 and the old disc in drive 1 it is possible to call up the original password and either use it or bypass it.

"We were pleased to be able to help this school overcome its problem, but the lesson to be learned is that vital passwords should be shared by more than one responsible person, just in case of an emergency".

Quick off the mark

EDUCATION Micro User received its first letter within hours of last month's magazine hitting the streets.

But what made it so unusual was that it had winged its way from Australia.

Martin Levins, the writer and a teacher Down Under, was swift off the mark to question Philip Andrews' article questioning the future of comms in schools (see Page 43).

But he did have a head start over the other contributors to the mailbag. For he used electronic mail to ensure that his message made its way to *The Micro User* in the shortest possible time.

Naturally, with Australia being up to 10 hours behind the UK, it meant that his letter was delivered via MicroLink, the UK based international electronic mail service, before it was sent!

"There is little wonder that the Royal Mail is having difficulty keeping up with us these days", said a MicroLink spokesman.

Coloured Lights listing

From Page 37

```
 1550 ans%=ans%-48:PRINT;ans%
 1560 PROCCIRCLE(400,700,300,4,2)
 1570 CLS:IF ans%=0 PRINT"WELL DONE "
;name$(n%):score%(n%)=score%(n%)+1 EL
SE PRINT"WRONG"
 1580 TIME=0:REPEATUNTILTIME>500:*FX1
5,0
 1590 VDU26:COLOUR128:CLS:PRINT''''"L
ESSON OVER!!"'''"PRESS SPACE TO"''"RE
START PROGRAM":REPEAT UNTIL GET=32:CL
S:PROCmenu
 1600 ENDPROC
 1610 DEFPROCCIRCLE(X,Y,R,C,S)
 1620 GCOLS,C
 1630 LOCALI,J
 1640 FOR I=Y+R TO Y-R STEP -4
 1650 J=SQR(ABS(R*R-(I-Y)*(I-Y)))
 1660 MOVE X-J,I
 1670 DRAWX+J,I
 1680 NEXT
 1690 ENDPROC
 1700 DEFPROCmenu
 1710 COLOUR128:CLS
 1720 COLOUR132:COLOUR2:PRINTTAB(2,2)
"COLOURED LIGHTS"
 1730 COLOUR131:COLOUR4:PRINTTAB(0,6)
"Here are the options"
 1740 COLOUR134:FORY=9 TO 22:PRINTTAB
(0,Y)SPC(20):NEXT
 1750 COLOUR1
 1760 PRINTTAB(0,10)"1) PRIMARY COLOU
RS"''"2) COLOUR ADDITION"''"3) COLOUR
 COMPLEMENT"'"4) COLOUR REMOVAL"''"5)
 COLOUR QUESTIONS"''"6) COMPLETE LESS
ON"
 1770 COLOUR129:COLOUR7:PRINTTAB(2,28
)"Make your choice"
 1780 *FX15,0
 1790 G$=GET$
 1800 IF G$="1" flag=0:PROCprimary:EN
DPROC
 1810 IF G$="2" flag=0:PROCcoladd:END
PROC
 1820 IF G$="3" flag=0:PROCcomp:ENDPR
OC
 1830 IF G$="4" flag=0:PROCcolsub:END
PROC
 1840 IF G$="5" flag=0:PROCname:PROCq
ues:ENDPROC
 1850 IF G$="6" flag=1:PROCname:PROCp
rimary:ENDPROC
 1860 GOTO1790
 1870 ENDPROC
 1880 DEFPROCname
 1890 IF n%=30 PROCscore
 1900 n%=n%+1
 1910 *FX15,0
 1920 COLOUR132:CLS:COLOUR3:PRINTTAB(
0,10)"Please enter your"''"name and t
hen press"''"Return.  "
 1930 INPUT'',name$(n%)
 1940 FORPP%=1TOLEN(name$(n%))
 1950 IF ASC(MID$(name$(n%),PP%,1))<6
5AND ASC(MID$(name$(n%),PP%,1))>32 OR
ASC(MID$(name$(n%),PP%,1))>90 PRINT''
"Don't be silly":TIME=0:REPEATUNTILTI
ME>300:CLS:GOTO1910
 1960 NEXT
 1970 IF LEN(name$(n%))<2 COLOUR129:G
OTO1920
 1980 IF LEN(name$(n%))>9 name$(n%)=L
EFT$(name$(n%),9)
 1990 IF n%>1 AND name$(n%)="SCORE" n
%=n%-1:PROCscore
 2000 ENDPROC
 2010 DEFPROCinit
 2020 DIM name$(32):n%=0
 2030 DIM score%(32)
 2040 VDU23,254,255,129,129,129,129,1
29,129,255

 2050 VDU23,255,255,255,255,255,255,2
55,255,255
 2060 VDU23,224,12,12,63,63,51,51,63,
63
 2070 VDU23,225,0,0,255,255,255,255,2
55,255
 2080 VDU23,226,63,63,51,51,243,243,3
,3
 2090 VDU23,227,255,255,207,207,207,2
07,207,207
 2100 eleph$=CHR$224+CHR$225+CHR$10+C
HR$8+CHR$8+CHR$226+CHR$227

 2110 ENDPROC
 2120 DEFPROCscore
 2130 COLOUR132:CLS:COLOUR7
 2140 VDU14
 2150 PRINT
 2160 FOR pos%=1 TO n%
 2170 PRINT name$(pos%);TAB(17);score
%(pos%)
 2180 NEXT
 2190 IF n%=30 END
 2200 REPEAT UNTIL GET=32
 2210 VDU15

 2220 PROCmenu
 2230 ENDPROC
 2240 REM DOWN LOAD MEMORY FOR DISC S
YSTEMS
 2250 *TAPE
 2260 FOR I%=0 TO TOP-PAGE STEP 4:I%!
&E00=I%!PAGE:NEXT:?&13=?&13-(PAGE-&E0
0)DIV256:PAGE=&E00:RUN
```

PLYMOUTH
OPEN
LEARNING
SYSTEMS

APPLICATIONS PACKAGE
FOR
BBC COMPUTER

The Materials

- An Applications board
- Mains adaptor – 9V, 1A
- A User's Manual
- An Interface connector
- Logic probe
- An Applications Manual

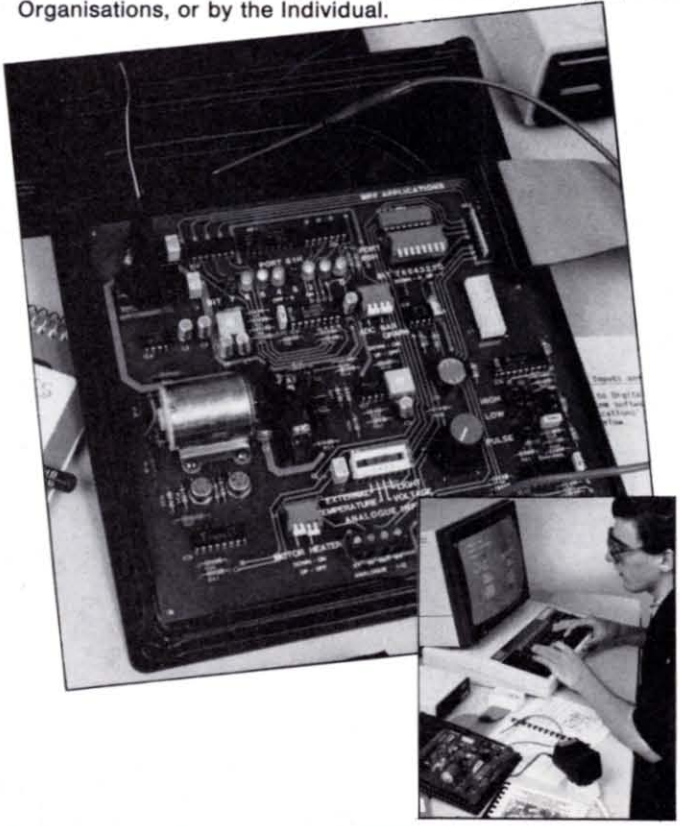
Experiments

The Experimental Manual contains 15 self-teach style experiments. The experimental concepts of each experiment are given, followed by the program to be entered and the procedure to be adopted. The 15 experiments are:

- Input/Output programs
- Delays in programs
- Motor operation
- Adding Int. data
- Wave form generation
- Temperature control
- Digital volt meter
- Sequences with variable delays
- Making decisions
- Analogue to digital conversion
- Using a logic probe
- Bit masking and testing
- Event counting
- Conditional sequences
- Motor speed control

Who can benefit from the package?

The package is of benefit to those who wish to use their BBC computer for control purposes. The self-teach style experiments make it easy to use. It may be used in Schools, Colleges, Industrial Organisations, or by the Individual.



The Applications Board – Features:-

- 8 pole switch for 8 bit digital input
- 8 coloured LED's for 9 bit digital output
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- Comparator which provides 8 bit Analogue to Digital conversion when used with the DAC.
- 10 segment bar-graph display which gives an indication of the Analogue Output.
- Small DC motor with forward and reverse drive capability
- Properller on the motor shaft which acts as a fan
- Infra-red beam which is cut by the propeller for revolution counting
- Heater
- Temperature sensor (heated by the heater and cooled by the fan)
- Light intensity sensor
- Potentiometer to provide a variable analogue voltage
- External analogue input and output connector
- Logic probe – with High, Low and Pulse indication. The probe can be used on all parts of the system
- External digital input/output connector

Post to: **Plymouth Open Learning Systems Unit, Kings Road, Devonport, Plymouth PL1 5QG. Tel: (0752) 264762**

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In addition to the BBC package Plymouth Open Learning Systems Unit produce Microelectronics/Electronics teaching packages. It is possible to obtain B/TEC Unit award using these teaching packages.

Please tick box for information. ☐

Computer control

By Philip Andrews

COMPUTER control is a fascinating subject, rich in educational objectives. At the moment it is largely taught by the enthusiast – the teacher who is prepared to build his or her own apparatus, and to program the specialised software needed.

Four things are required – a micro, an interface, model making equipment and software to drive it all. The BBC Micro with its analogue and user ports is ideal for control.

Secondly you need an interface box. Many designs are available, possibly the best for the user port being one by Deltronics called Control-It with eight lines for both input and output (it uses the printer and user ports).

It has LEDs on the output lines and four switched pairs of motor control outputs. Two versions are available, with or without an integral power supply to drive the motor outputs.

The power supply can be set to either six or twelve volts output, using a key switch (a nice touch that).

Deltronics also makes an analogue port interface called Sense-It, which like the other interface is fully protected.

Apart from being a well-designed system using standard plugs, the Deltronics equipment is available with a range of switches, sensors and leads. Thus a complete interface set, using both Control-It and Sense-It with all the associated sensors, can be obtained for about £125.

The next requirement is some flexible model-making system. In primary schools the flexible medium of Lego makes it ideal. The Lego motors can be driven straight from the powered Deltronics interface, making it simple for children and teachers to use.

Lego also has the advantage that most children are familiar with its construction capabilities, and many schools already have some. Lego is very keen to get into the education market and has produced its own system of interfaces and software for use in schools, supported by some new Technic

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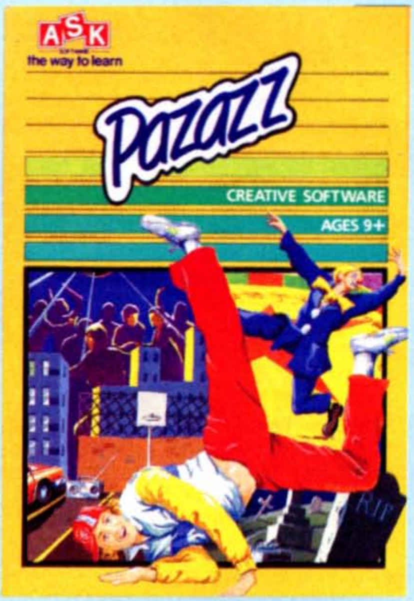
Simple design and choreography

Program: Pazazz
Price: £12.95
Supplier: ASK, London House, 68 Upper Richmond Road, London SW15 2RP. Tel: 01-874 6046



PAZAZZ allows you to use the computer to design and simulate scenes from a dramatic production. You design the backdrop scenery, costumes, compose the accompaniment and choreograph the movements.

The program is divided into four parts, scenery design, musical score composition, costume design and movement choreography. You use a simple colour graphics editor to design the scenery, with the cursor controlled by either keyboard or joystick. Scenes may be individually created, edited and saved. The editor includes commands such as fill and circle, as well as drawing lines and boxes.

The composition of a musical score requires the ability to play a keyboard instrument since it is entered in real-time using the bottom two rows of the BBC keyboard which acts as a four octave synthesiser. Two tunes may be entered and played back together to form a single melody.

The display for the music editor is a piano keyboard, and two tables containing numbers for octave, sound, note number and the total number of notes stored. As the notes are keyed in the corresponding keys on the screen light up and the information in the tables is updated. Its other features include rhythm and beat, copy notes and stepping through the tune note by note.

Designing the costumes is done by colouring pixels within a grid divided into head, body and limbs.

The final part of the program brings all the others together into the complete production. Having loaded the backdrop and character, it may now be animated to the music. Each individual part of the character may be rotated either to the left or right, as well as the entire character itself. Once this is done the completed production may be played at full speed with accompanying music. The package comes with predefined demonstrations including a break-dancer going through his paces in a New York street and a skeleton dancing around a graveyard.

Overall this program provides a flexible package for simple design and choreography, allowing greater individual expression without the need for costly resources.

Tarquin Thomas

Tackling music to good effect

Program: Peter Beater's Music Games
Price: £13
Supplier: System, 12 Collegiate Crescent, Sheffield S10 2BA. Tel: 0742 682321

THE amateur composer market, in which software houses have vied furiously with each other to squeeze the last drops of sound and graphics out of the BBC Micro, has been thoroughly saturated, and is now slowing down.

On the other hand, the wind seems to be blowing fair for the primary school music teacher, who looks for direct educational value rather than just the educational spin-off from brilliant screen displays and impressive demonstrations of what can be achieved with just one 76489 sound chip. Very young children are less impressed by computer wizardry than their elders.

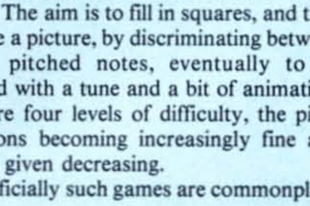
So it is that Peter Beater and Jolly Jack Tar, two musical packages which would hardly even turn your head if left running at a computer show, are in their own way at the forefront of computer assisted learning.

Peter Beater Plays with Pitch is concerned with the development of aural skills in the very young (three to nine years). It consists of two programs, Melody Rainbow and Musical Jigsaws, aimed at helping children understand musical concepts such as "lower" and "higher", concepts which are far from obvious to small children, and even to some adults I know.

Melody Rainbow is built around the old notion of linking pitch with colour – Peter Beater moves up and down a rainbow, beating his hammer on its bands when a key is pressed, and producing notes of different pitch and duration on a C Major scale. The notes are stored, and can be played back while Peter conducts.

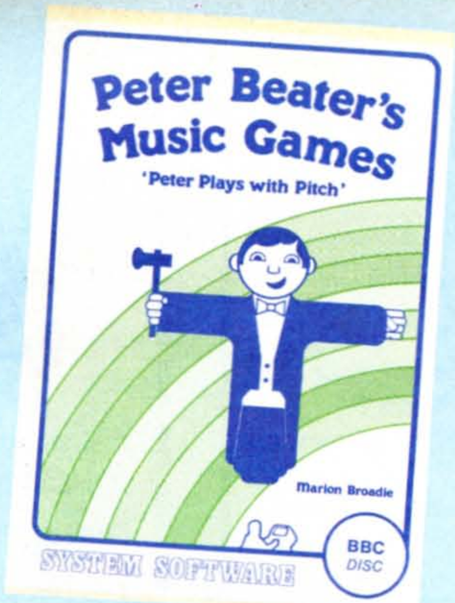
Musical Jigsaws is based on four nursery rhymes. The aim is to fill in squares, and thus complete a picture, by discriminating between various pitched notes, eventually to be rewarded with a tune and a bit of animation. There are four levels of difficulty, the pitch distinctions becoming increasingly fine and the help given decreasing.

Superficially such games are commonplace and unassuming. It is only when they are combined with the advice given in the instruction manual that they take on their full significance. The manual, aimed at parents and teachers, is packed with ideas on how to get the best out of the games. It contains a long section on additional activities for helping children develop a sensitivity to pitched sounds, such as making instruments out of whatever is to hand, listening attentively to sounds in nature, and comparing natural sounds with the synthesised variety produced on the BBC Micro.



Jolly Jack Tar has roughly the same objectives, but as a program is more ambitious. There are six games in all, and they include beating out rhythms on the spacebar in time with tunes played at different tempi (with a visual display of the child's performance), recognising note values, distinguishing between two notes of different pitch, and working with simple musical notation.

The emphasis here is on achievement and reward, and for this reason, in addition to the main menu which can be used by the child to choose a game, there is also a teacher's control menu which allows targets, levels of difficulty, pitch differentials, tempi and so on to be adjusted according to the ability and experience of the learner.

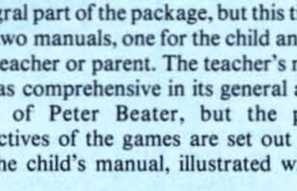


The teacher's menu can also be used for choosing a series of games and up to 10 players who will play them in turn, each with different pre-selected parameters. The program in any case requests the name of a player before a game can begin, so that a percentage score can be recorded on disc. A maximum of 60 records can be saved, and they can be inspected and deleted if necessary.

As with Peter Beater, the reward offered at the end of a game is a tune and some animation. But here the animation is partly interactive – the arms and legs of a dancing Jack Tar can be controlled by the child, hopefully in time with the music. This is surprisingly effective for a display using relatively uncomplicated graphics.

Once again the documentation is an integral part of the package, but this time there are two manuals, one for the child and one for the teacher or parent. The teacher's manual is not as comprehensive in its general advice as that of Peter Beater, but the principal objectives of the games are set out clearly.

The child's manual, illustrated with black and white line drawings, consists of descriptions of each game in simple language, and thus invites the child to take part not only in playing the games but also in understanding the workings of the program, rather than leaving this entirely to the adult. There is a lot to be said for such an approach, and too few primary level educational programs capitalise on it.



Both these packages are in their slightly different ways the result of a good deal of thought about how best to tackle music with young children. Programs like them, in which the emphasis is firmly on musical development, are revealing new possibilities in the field of primary music education.

Gabriel Jacobs

→

kits. Lego also makes a simple buggy kit.

Lastly, software is required to drive the interface. It is unrealistic for pupils to have to program in Basic for this.

What has been lacking for quite some time now is software which will allow children access to some of the simple programming tools without needing to go too far into the syntax of a language such as Basic.

Many children are now starting to use Logo in the classroom and find the syntax of this language quite easy to use. Recently Resource launched a program called Control-It to work with the Deltronics or any other interface unit.

Along the top of the screen is printed the status of the eight bits of the user port, the eight bits of the printer port, and the six lines of the analogue port (four analogue and two digital). It is easy to configure the program to show the status of just some of these. Control-It allows the following commands:

start, stop, reset, wait, switch, end, let, input, repeat, until, for, next, if, print, output, parameter, cassette, hoot, label, build, edit, delete, load, save, list, cat, trace, commands, star, finish, labelmotor, speed, forward, backward, halt, invertinputs, show, hide, clone

One great advantage of this software is its cost. The education price for the disc and handbook together is £8.

Resource has also produced a software pack to support the Deltronics Sense-It interface. This should be useful to scientists. The educational price is £6.50.

Knitting softwear

ON the subject of unusual but useful software, a new package for knitters – yes knitters – has been published.

The program allows an endless variety of original colour designs to be created on the screen. These are then converted by the computer into a knitting pattern for hand or machine knitting.

This must surely be the most unusual computer aided design package for the BBC Micro. The software is not cheap at £51.50, but there is a discount for educational establishments.

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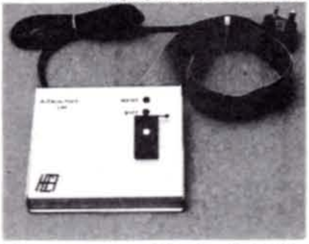

Recently launched, this exciting addition gives the user all he could possibly require from a programmer and more. Well constructed in a metal, custom-built box, it is a professional unit at an affordable price.

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Yie Ar Kung Fu	12.95	10.95
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Way of Exploding Fist	14.95	12.95
Strike Force Harrier	12.95	10.95
Thrust	11.95	10.45
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Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

The case for lower case

I REFER to the article by Joe Pritchard in the August issue of The Micro User *which forces all input to upper case. Having written much educational software myself, I believe that as far as the junior school is concerned all input and output should be in lower case as this is what the youngsters are taught first.*

However I do not intend to discuss the rights and wrongs of upper and lower case, as everyone is entitled to their own opinions. My main reason for writing is to impart a short and simple method of converting output to either upper case or lower case in all modes except Mode 7.

Memory location &367 contains the font flags and determines whether or not a particular font zone is to be read from ROM or RAM. The high address byte of the font zones are contained in locations &368 to &36E and are normally set to &0C. The font zones we are concerned with are characters &40 to &5F (location &369) and characters &60 to &7F (location &36A). The character sets themselves are contained in the MOS ROM at locations &C100 and &C200 respectively.

By setting bits 4 and 5 in location &367, the operating system thinks that the character sets for upper and lower case are held in RAM. To fool it even further, simply put the relative ROM address in locations &369 and &36A.

Therefore, to convert all displayed output to upper case, all that is required is the single statement:

```
!&367=&C1C10C3F
```

and to convert all displayed output to lower case:

```
!&367=&C2C20C3F
```

I hope that this is of some use to Joe Pritchard and any other interested parties. – **Phil Williams, Sittingbourne, Kent.**

The case for modems

I WRITE in response to Phillip Andrews' article on the uses of modems in schools. As a teacher in Australia, I have made use of modems over the last three years, and, with this experience in mind, I would like to comment on some of his assertions.

I think the point needs to be made that the uses of computer communications in schools can be more varied than the article has stated, and therefore the uses of modems in schools can be of enormous benefit, irrespective of the motive behind their supply.

I believe that the uses to which the technology can be put have not yet been fully explored; rather, a sort of technological determinism is operating that says that modems are new, therefore schools must use them. In turn, educators look to existing structures such as viewdata services and electronic mail and see them as replacements for existing technologies such as books or telephones, rather than adjuncts.

The same sort of thinking is evidenced by the "teacher replacement" concept of the role of micros in schools that was so prevalent not so long ago.

I would suggest that one of the most fruitful uses to which modems can be put is the bulletin board. In Australia schools are currently experimenting with such boards, which might contain software reviews, hardware tips, conference details, exam questions to name but a few. It is possible, for example, for a teacher to use a simple query language on a board to download exam type questions relevant to say, Hamlet, and save the ever-present problem of framing decent questions that are free from the one teacher's bias.

Likewise, students from the city are sending essays that they have written on the rural economic crisis to the schools board, and asking students in the country for their comments. Others are collecting data and analysing national or state wide trends in quantities as diverse as air temperature or employment.

We have also experimented with the sending of Fleet Street Editor-type files and database files, both of which have been very successful.

Possibly the most exciting usage is communication with other cultures where social studies, history, geography and language teaching take on a whole new dimension. We may well ask (as does Phillip) why such communications do not happen with more conventional technologies such as the phone or mail. Perhaps some answers would be the sense of immediacy and the range of potential readers: the ability to extend, rather than replace conventional information gathering techniques.

It would be foolish to write to all schools in the region by conventional mail and hope for a reply. Electronic bulletin boards are ideal for the initial contact. It is then up to the users which technology best serves their needs for further communication.

As for viewdata, I agree with the assertion that much of the information contained by Prestel-like services "has little real relevance for general school use", but this does not mean that we should discount them entirely.

As Phillip points out: ". . . geography and economics are quite well catered for". Particularly in an area such as economics, where information is very volatile and texts age quickly as a result, why not make use of the most appropriate technology? Furthermore, such services usually offer commentary as well as data; enhancing the quality of the student's understanding.

I would urge teachers and students to look for rational uses of this technology, not as a replacement for, but as an enhancement of the more conventional teaching aids. – **Martin Levins, Mt. Butler, Australia.**

Mini Office course

A COURSE at Manchester University this autumn is to feature the revolutionary Mini Office II software package – and the man who led the team behind it.

Peter Davidson will be the guest lecturer for the 10 week evening session which starts on September 30.

It was Peter, now Education Editor of *The Micro User*, who headed the Database Software Mini Office project.

Further details about the Manchester University course – "An introduction to Business Software" – are available from senior staff tutor Douglas Kay on 061-273 3333 ext 3532. The fee is £27.50 and no previous experience of computers or business software is necessary.

Cut-price fax

A SCANNER for photographs, diagrams, maps and display data has been launched by Linear Graphics.

It is aimed at the education market, and the company claims that if schools use Linscan with one of the new modems being given away under the DTI scheme, they will effectively have a cut-price fax system.

The Linscan control unit connects to the user port of the BBC Micro. It works in conjunction with Linear Graphics' Plotmate graphics plotter connected to the micro's printer port.

Once the scanning area is set up using the cursor keys, the optical head tracks across the drawing platen collecting data at a rate of 500 points per second.

The data may then be saved to disc in screen image form to be subsequently processed by AMX Pagemaker or Fleet Street Editor.

A second format enables the user to store data at an even greater density, allowing the saved image to be charted on Plotmate at 0.2mm spot resolution. If required, plotted output size may be reduced, enlarged or inverted.

Data may be dumped to Epson compatible dot matrix printers.

Linscan carries a price tag of £150.

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Super Spell

QUESTION: 9
WHICH SIGN GOES IN THE BOX?
SCORE:

NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten

NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER IS 35+3 =38
PRESS SPACE
37
35+3

BALANCE
Learn maths the fun way. Type in the answer to balance the scales

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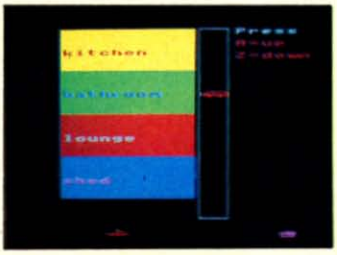
Anagram
Codebreaker
Dog Duck Corn
Guessing
Hangman
Maths Hike
Nim
Odd Man Out
Pelmanism
Towers of Hanoi

HANGMAN
Improve your child's spelling with this fun version of the popular game


kitchen
bathroom
lounge
shed
Press
8=up
2=down

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 159

In the army now

Program: Who Dares Wins II
Price: £9.95 (disc only)
Supplier: Alligata, 1 Orange Street, Sheffield S1 4DW Tel: 0742 739061

AS your army fell back under the enemy onslaught many of your comrades were taken prisoner and unless someone goes in to rescue them they will certainly be killed. Sure enough, that someone is you.

Who Dares Wins II is another "one man against an army" game in the same vein as Commando from Elite. Armed with only a machine gun and five grenades you must fight your way deep into enemy territory.

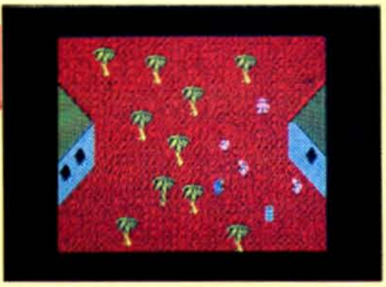
The opening screen gives an aerial view of a desert scene complete with palm trees and huts. A small company of enemy soldiers shoot at you as you make your way to the top of the screen. Your machine gun always fires in the direction in which you are facing, and this also applies to grenades which are launched using Shift or Fire.

As you near the top of the screen it scrolls down jerkily revealing new obstacles and more troops. Some soldiers will fire from behind stone walls, but they can be disposed of with a well placed grenade.

After several screens you encounter a captured comrade guarded by an enemy soldier. Shoot the bad guy as quickly as possible, or your comrade will be executed.

You eventually reach an enemy outpost from which pours hordes of soldiers. Having mown these down you are congratulated on having reached the first outpost and your score is displayed.

The cycle then repeats itself but with more troops and obstacles to overcome. The route to the third outpost is treacherous as it is dotted with areas of quicksand. These are the same colour as the background except for a faint shimmering.



You will also have to knock out enemy tanks which fire a constant barrage of shells. Taking out the tanks wouldn't be too bad were it not for the fact that you must negotiate a maze of pools and quicksand at the same time.

Who Dares Wins II has a greater number of features than Commando but the graphics are not as good. I suggest you try them both, bearing in mind that the former is only available on disc.

Steve Brook

Sound	*7*
Graphics	*7*
Playability	*8*
Value for money	*8*
Overall	*8*

True love's triumph?

Program: Mikie
Price: £9.95
Supplier: Imagine, 6 Central Street, Manchester M2 5 NS Tel: 061-835 1353

SET in an American high school this game stars an all American schoolboy, Mikie, who is trying desperately to get a message to his sweetheart and you've just volunteered to help him.

The first screen provides an aerial view of a classrooom. There are nine desks with pupils sat at each one, and beneath five of their stools are little red hearts. As you collect each one they change into letters to form a message to his girlfriend.

When you collect the fifth heart the classroom door opens allowing you on to the next level.

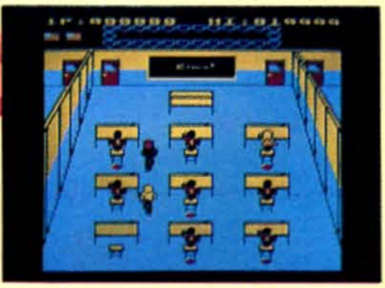
Collecting these isn't quite as easy as it could be as your fellow pupils won't stand up to let you at the hearts. You must therefore bump them off their seats using your hip-zap technique.

On top of this you receive a great deal of hassle from the teacher who doesn't like you disturbing the class. If things begin to get too hairy you can always find yourself a vacant stool and sit down for a while.

Having escaped the classroom you must negotiate the hallway to reach the next room. The hall is patrolled by a teacher and the mad janitor, so nimble footwork is required.

Screen two is set in the locker room with several lockers containing three hearts. You must stand in front of the locker and press the Shout key three times to release the hearts. This time you are being chased by the teacher, janitor and chef. The same kind of thing is repeated in the canteen, gymnasium and schoolyard.

I found survival has too high a degree of randomness attached to it. Sometimes the teacher will plod around in a corner and you sail through the screen.



On other occasions he will be hot on your heels and you will lose all three lives on the first screen. The graphics are crude and the animation not much better.

Mikie was never destined to be a blockbuster, but a little more care on the graphics side would have been greatly appreciated.

Jon Revis

Sound	*7*
Graphics	*6*
Playability	*6*
Value for money	*7*
Overall	*7*

Go for gold

Program: Commonwealth Games
Price: £7.95 (cassette) £9.95 (disc)
Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE. Tel: 091 414 4611

AS so many athletes boycotted this year's Commonwealth Games in Edinburgh you have been given the opportunity to enter eight of the events. Have you got what it takes to compete with the world's greatest athletes?

The eight events are stored on one side of a cassette and must be loaded in strict sequence – there is no menu allowing you to load individual events. You compete in hammer throwing, swimming, cycling, 400 metres, long jump, steeplechase, rowing and weight lifting. Pressing the Z and X keys alternately determines power or speed, while the Spacebar initiates a throw.

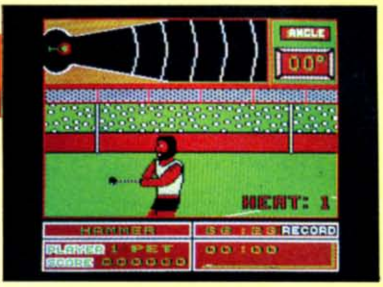
The graphics are drawn on the grand scale – none of these weedy little stick men running around.

In the hammer throwing you only see the top half of the athlete as he turns in the circle. After his third turn a meter displaying an angle bursts into life.

Hit the Spacebar when it reaches the angle you desire and away soars the hammer to an incredible distance – of about 5 metres in my case.

The cycling is another graphically pleasing and original event. The action takes place in three separate screen windows, the top displaying a plan of the circuit and indicating your position.

The next one provides a sideways view of you on the bike, and the third a head-on view. Great care must be taken not to enter the bends too quickly or you'll find yourself rolling down the track ahead of the bike.



In the events which are completed quickly, such as the hammer, the ability to re-run would have been helpful. Likewise with the long boring events such as the 400 metres. It would have been nice to have had an abort key which allowed you to skip one or two of the heats if you so wished.

Commonwealth Games is a fine example of an athletics program but could have been even better with a little more forethought.

Steve Brook

Sound	*5*
Graphics	*9*
Playability	*7*
Value for money	*8*
Overall	*8*

Knight battles

Program: Joust
Price: £9
Supplier: Delos Harriman, 290 Clarence Road, Four Oaks, Sutton Coldfield, West Midlands B74 4LT Tel: 021-354 8069

JOUST is set in the days when knights in shining armour fought their battles sitting astride huge green buzzards and pink storks, and is an officially licenced version of Atari's minor arcade hit of the same name.

The opening screen consists of one large land mass at the bottom of the screen with bridges to its left and right. The bridges are there to prevent you from falling into the lava below. In the sky are several smaller platforms which hover motionless, and the player can stand on these.

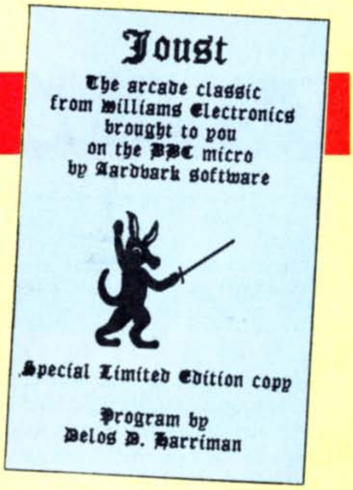
The game can be played by one or two players. In the two player option inexperienced players can combine against the computer's bad guys, but more experienced players can compete against each other as well as the micro. Your controls consist of left, right and flap, the key to the game lying in the mastery of the rock-steady hover.

Sitting astride your blue ostrich you appear on any of several energiser pads, and until you press a key you remain invulnerable. Then battle commences.

The first wave consists of four bad knights know as Bounders. To defeat a knight in combat you must collide with him, and the winner of the clash will be the one whose lance is the highest at the moment of collision.

As you progress the numbers and types of enemy knights will increase, and you may also be buzzed by a pterodactyl. The scenery changes too – the floating islands decrease in number and the bridge vanishes.

Once the bridge has gone you must steer clear of the lava or the lava troll will grab your mount and drag you both to a terrible death.



Joust
The arcade classic
from Williams Electronics
brought to you
on the BBC micro
by Aardvark software

Special Limited Edition copy

Program by
Delos D. Harriman

Two player games have always been thin on the ground, and Joust is great fun either with a friend or against the computer. With such variety built into it, this is a game which you will come back to time and time again.

James Riddell

Sound	*7*
Graphics	*8*
Playability	*9*
Value	*9*
Overall	*9*

Call their bluff

Program: Poker
Price: £5.95
Supplier : Duckworth, The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY Tel: 01-485 3484

THE smoke hangs heavy in the still air of the Wild West saloon. With an evil glint in his eye Black Jake raises the stakes once more.

Is he bluffing? Can you afford to find out? Just two of the nail biting questions you will ask yourself as you play Poker from Duckworth.

Here is an opportunity to pit your skills against six of the meanest players in a game of five card draw poker.

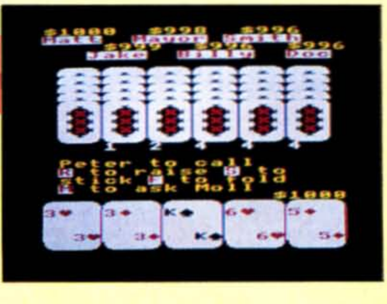
Instructions on how to play the game are provided within the program, so even if you have never played poker before you will be able to hold your own with the best of them within 10 minutes of loading the game.

Play is simplicity itself. Whenever you are due to make a move a menu of the available choices is displayed. The micro even sorts your cards into the right order.

The dealer deals six hands face down and one for you face up, this being followed by the first round of betting. Stakes are raised in multiples of eight dollars, with no upper limit.

You begin the game with 1,000 dollars. You can stick, throw in your hand or discard up to three cards. Any new cards are dealt and the second round begins. Betting continues until all remaining players have agreed to see each other's hands. At this point the computer announces each hand in turn and pays out the winner.

If you are new to the game you may be unsure of the best move to make, so you can have a quiet word with Moll the barmaid who will make suitable suggestions.



On occasions it can be quite rewarding to bluff your way through a hand. Your opponents are all experienced players and will often do the same thing.

I found Poker to be totally absorbing. Even though the money wasn't real I still got a thrill from collecting a big win.

Steve Brook

Sound	*6*
Graphics	*7*
Playability	*9*
Value for money	*9*
Overall	*8*

ESP and all that

Program: Paranormal
Price: £5.95
Supplier: Riverdale Software, 95 Printon Avenue, Manchester M9 3JW. Tel: 061-795 6539

PARANORMAL, a collection of four Basic programs on one cassette, takes a light hearted look at the paranormal.

The first program is Numerology, based on the study of how certain numbers affect our lives.

You enter your name, date of birth, and the present date. The program then calculates your own personal number, uses it to analyse your character, and then combines this with astrological data to forecast your future over the next 24 hours.

The data can be directed to a printer should you require a hard copy.

ESP (Extra Sensory Perception) is a program designed to test your ability to predict an event which is yet to take place. The micro will select one of five symbols, and you must predict which one it has chosen. The computer then analyses the results and comments on your ESP abilities.

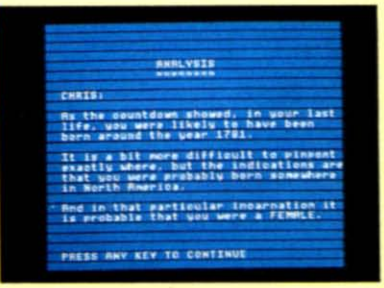
Reincarnation is purely for fun. Having entered your name, date of birth, and sex, the computer will make a guess at the circumstances of your last incarnation.

I was a female politician who was born in 1794 somewhere in Eastern Europe.

The final program is Biorhythms. Having entered your date of birth and today's date it displays a summary of your emotional, physical and intellectual state over the next two days.

This program contained a small bug. Having obtained a printout of my results I chose to exit at the appropriate prompt. The program returned me to Basic but didn't switch off the printer.

No sound is employed in any of the programs and no attempt made to produce an attractive screen layout.



```
              ANALYSIS
              ********

CHRIS:

As the countdown showed, in your last
life, you were likely to have been
born around the year 1781.

It is a bit more difficult to pinpoint
exactly where, but the indications are
that you were probably born somewhere
in North America.

And in that particular incarnation it
is probable that you were a FEMALE.


PRESS ANY KEY TO CONTINUE
```

These are the type of novelty programs which may find their way on to the pages of some magazines and, as such, don't justify the asking price of £5.95.

I may have no ESP ability whatsoever but I can confidently predict that this collection of programs will get no higher than position number 100 in the Mongolian software charts.

Carol Barrow

Sound	*0*
Graphics	*N/A*
Playability	*3*
Value	*3*
Overall	*3*

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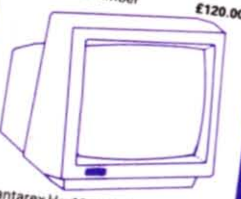

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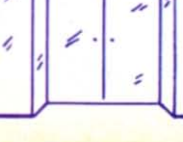

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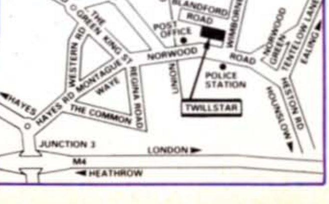

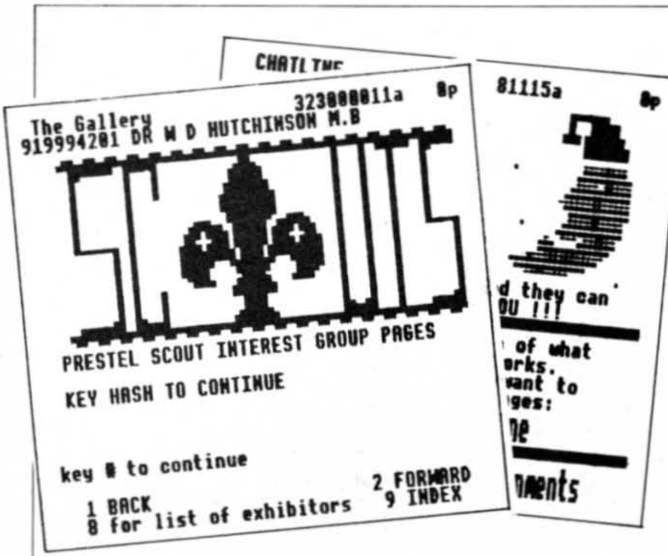
CHATI THE

The Gallery 323000011a 0p
919994201 DR M D HUTCHINSON M.B

PRESTEL SCOUT INTEREST GROUP PAGES

KEY HASH TO CONTINUE

key # to continue

1 BACK
8 for list of exhibitors
2 FORWARD
9 INDEX

81115a 0p

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Crystal clear Mode 7 dumps – via Mode 4

ROBIN NIXON shows how it's done

THIS program combines some of the techniques we covered in the Custom Characters series last March, April and May to produce clear, compact Mode 7 screen dumps on Epson compatible or Olivetti ink jet printers.

As you know Mode 7 – taking up only 1k of memory – uses some clever compression techniques to achieve quite often stunning displays. However the techniques used make it very difficult to write screen dumps.

One way of simplifying things is to recreate a Mode 7 screen in Mode 4. This means that the resulting screen will be in black and white, enabling us to write a simple dump because it is then only necessary to read bytes from the screen and copy them out to the printer.

The main problems occur in creating the Mode 4 copy. Figure I shows codes which must be taken into account.

CODE	EFFECT
129-135	Alpha characters.
140	Normal height.
141	Double height.
145-151	Graphic characters.
152	Conceal display.
153	Contiguous graphics.
154	Separated graphics.

Figure I: Mode 7 characters

The codes in Figure II are all labelled as "nothing" in the user guide. However the teletext chip involved is the SAA5050 which was originally designed to provide teletext for ordinary TVs, and the extra codes are mainly for that purpose.

Codes 138 and 139 are Box end and Box start. This is for use when superimposing teletext on top of a TV picture. Normally when you do this all backgrounds are ignored.

However the Box facility provides you with a black background which is useful for page headers, the clock and subtitles. The other five codes are included for compatibility with other data codes.

128	NUL
138	Box end
139	Box start
142	Shift out
143	Shift in
144	Data link escape
155	Escape

Figure II: The reserved codes

For example, Data Link Escape (DLE) is used in communications where you are being sent information and realise you don't want to receive it after all. Sending a DLE causes the computer you are communicating with to cancel transmission.

In actual fact the SAA5050 only uses seven bits of a byte, so all these codes should have 128 subtracted from them. This shows us that the NUL is 0 and Escape is 27 and so on as we would expect.

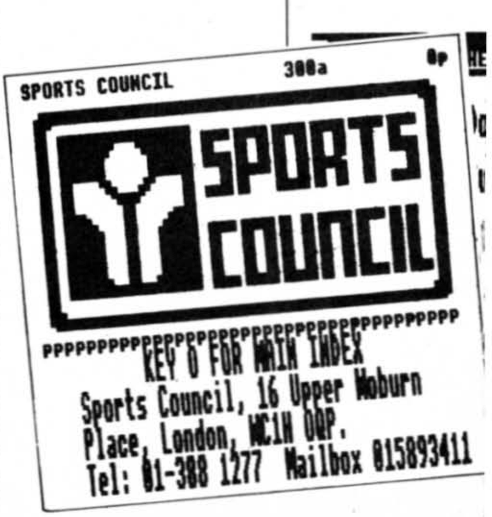
The reason all the teletext codes have had 128 added to them is to allow for the 31 control characters the BBC Micro already has.

When reading from a Mode 7 screen bear in mind three exceptions. Because the teletext character generator uses slightly different character codes to the rest of the BBC Micro the following codes are converted:

&23 (#) is translated to &5F (_).
&5F (_) is translated to &60 (£).
&60 (£) is translated to &23 (#).

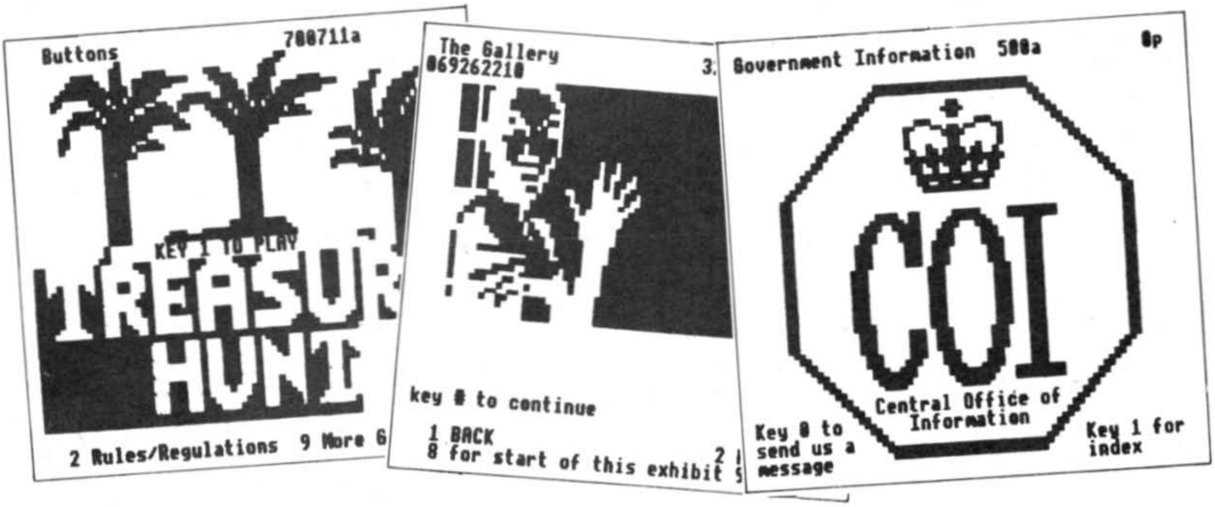
One interesting feature of the SAA5050 is that it uses a character-rounding technique which searches through a character looking for any pixels that are diagonal to each other and then places a quarter pixel in any corners. This accounts for the clarity of Mode 7.

On to how the program works. To prevent destroying the screen data when the mode is changed it starts off by copying a Mode 7 screen to &5400, which is 1k below the start of a Mode 4


MICRONET 800 (C)

SPORTS COUNCIL 300a 0p

PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
KEY 0 FOR MAIN INDEX
Sports Council, 16 Upper Woburn
Place, London, WC1H 0QP.
Tel: 01-388 1277 Mailbox 015893411



Buttons 700711a

KEY 1 TO PLAY

TREASURE HUNT

2 Rules/Regulations 9 More 6

The Gallery
069262210 3

key 0 to continue

1 BACK
8 for start of this exhibit 2

Government Information 500a 0p

COI

Central Office of Information

Key 0 to send us a message

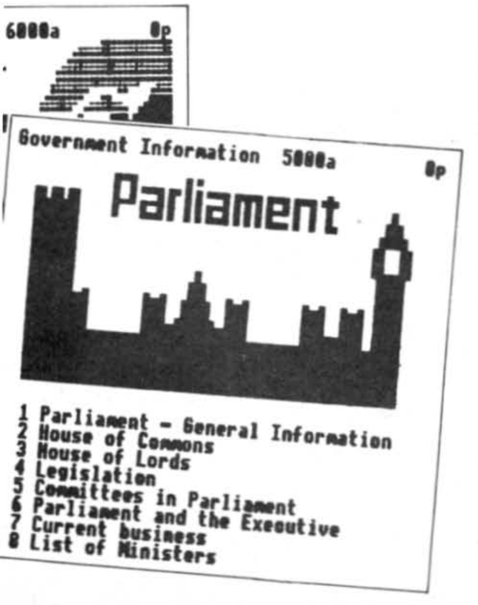
Key 1 for index

screen. This is done by lines 520-640. Then lines 680-710 change to Mode 4.

Lines 780 to 1150 are the main control loop. They load each byte in turn from the stored screen and process it according to whether it's a control, alpha or graphic character. All standard options are reset at the start of each line.

The main checking is done by *test* – line 2430. If you follow the listing from there to line 4030 you'll see that it checks whether the current byte is a graphic character, separated, contiguous, conceal, double height, normal height, a control code or one of the three exceptions.

Depending on any control codes one of the flags between lines 6310 and 6820 is set. These are used by lines 4070 to 5030 to determine the format of a character when it is printed.



6000a 0p

Government Information 5000a 0p

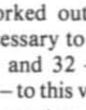
Parliament

1 Parliament - General Information
2 House of Commons
3 House of Lords
4 Legislation
5 Committees in Parliament
6 Parliament and the Executive
7 Current business
8 List of Ministers

For example lines 4070-4280 check whether or not a character is to be displayed in a graphics form. If so line 4320 branches to the graphics routine at line 5050. This builds up a character using the bit pattern in Figure III, and is similar to defining a character using VDU 23.

1	2
4	8
16	64

Figure III: The graphics character pattern



1+2+4+16 (+32+128) = 183

Figure IV: How character 183 is built up

Having worked out the character's value it is necessary to add 128 – to set the top bit – and 32 – to provide the correct offset – to this value. This means all graphic characters start at 160.

Although there is an alternative set starting at 32 this would not work correctly because, as you'll remember, three of these characters are swapped around by the operating system.

Figure IV gives an example of how character 183 is built up. Lines 5120-5220 clear character 255 which will be the user-defined character.

Then the six routines, *bit1* to *bit6*, set different parts of it. Finally lines 6170-6300 superimpose a blank grid on the character if it is to be separated.

In the case of double height, lines 4490-4770 read the definition of the current byte and redefine character 255 as a double height top or bottom half of the character to be displayed.

Once the complete screen has been converted then redisplayed in Mode 4 lines 1250-2250 copy the screen to an Epson compatible printer.

The Basic part of the program, line 6930 onwards, asks you to enter the filenames of up to 31 screens to be dumped. It then checks whether all the screens are there. If so the screens are dumped out, three per sheet of paper.

The dumps are fairly small, about 7cm x 7cm. This makes the dump very fast – about 30 seconds for a complete screen – and saves paper while retaining clarity.

If you are using the Olivetti JP101 spark jet printer you should ignore lines 1190-2410 of Listing I, replacing them with Listing II. You then need to add Listing III. The JP101 dumps are slightly smaller giving you four dumps per page.

Tape users should always set PAGE to &1900 before typing in or running this program. Also if you have a tape-based system remove lines 7120 and 7130.

Incidentally if you just call *readover* you can use the program purely as a Mode 4 screen dump. ■

Full listing starts on Page 126

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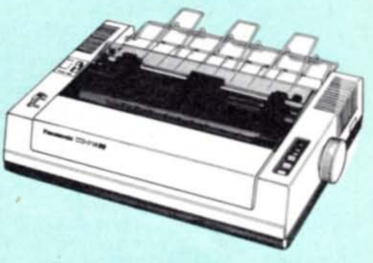

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A full 96 ASCII character set is supported, with an extended set of 32 international characters A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

As an extra special bonus to all Watford customers purchasing the KX-P1080 NLQ Printer, we are currently providing not only 1,000 sheets of fanfold paper completely FREE of charge but also a printer lead to connect the marvellous KX-P1080 to a BBC Micro, absolutely FREE. These gifts alone are worth £15.

Introductory Price: **£155** (carr. £7)

(FREE with every KX-P1080 printer purchased this month, 1000 sheets of Fanfold Paper, a Printer Cable and the popular Dump Out 3 ROM worth £43)

Continued →

MARK 2 LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.
The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£17**

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

● *Complete Disc Interface Kit incl. DFS ROM & fitting instructions*	**£54**
● *Acorn's 0.90 DFS Kit complete*	**£52**
● *DFS Manual (Comprehensive)* *(no VAT)*	**£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)	
● *Watford's sophisticated DFS ROM only*	**£16**
● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£12**
● *DNFS ROM only*	**£17**
● *ADFS ROM only*	**£25**

● *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

● *Complete DDFS Kit incl. fitting instructions*	**£46**
● *DDFS Manual* *(no VAT)*	**£6.95**
● *We will exchange your existing Single Density DFS Kit for our DDFS Unit at*	**£35**

Watford Electronics DDFS PLUS for the BBC B Plus

The Watford DDFS Plus, written specifically for the BBC B Plus Microcomputer, replaces the 1770 DFS from Acorn. It not only provides BOTH, single and double density operations in DFS mode, but the DDFS Plus also permits the use of an extended catalogue, giving 62 files per catalogue. It also incorporates all those excellent features of the popular Watford DFSs, and more.

N.B. SRAM and Tube functions not duplicated.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

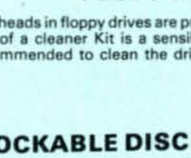
For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DISC ALBUMS **£4**

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.



STAK-PAK

The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

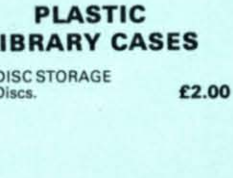
Five twin Packs incl.
10 Cassettes Only: **£5**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

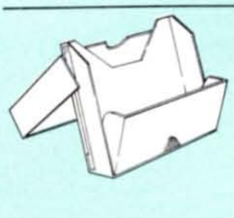
£8

LOCKABLE DISC STORAGE UNITS



Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 – holds upto 50 discs **£8**
M85 – holds upto 95 discs **£11**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	**£3.20**	Twin CLD (without PSU)	**£3.85**
Single CS (with PSU)	**£3.95**	Twin CD (with PSU)	**£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). Both are of Japanese manufacture.

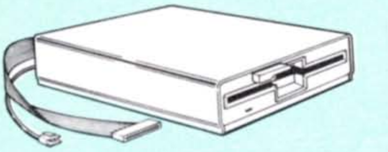
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

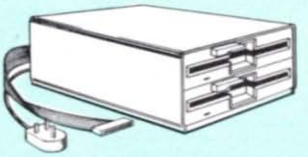
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. We are now able to supply all single disc drives in Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives; allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space; your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £99	
400K (720K)	CLS400S £97	CLD 400 £165	CS 400S £110	CD400 £189
800K (1.44M)		CLD 800S £183		CD 800S £205

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	**£10**
● *10 × 5¼" D/S D/D 40 Track Diskettes*	**£12**
● *10 × 5¼" S/S D/D 80 Track Diskettes*	**£17**
● *10 × 5¼" D/S D/D 80 Track Diskettes*	**£17**
● *Hi-Density 1.6M D/S D/D for IBM*	**£32**
● *10 × 3½" S/S D/D 40/80 track Discs*	**£20**
● *10 × 3½" D/D D/D 40/80 track Discs*	**£27**

3½" (FREE with every pack of 10 3M Discs, a handy Durabeam Torch) While stocks last.

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 ×* **M4** *S-S D/D 40 Track Discs*	**£9**
● *10 ×* **M5** *D/S D/D 40 Track Discs*	**£11**
● *10 ×* **M7** *D/S D/D 80 Track Discs*	**£15**

- *3" Double Sided Discs* **£4** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	**£16**	**£40**
M5	Double/Side Double/Density 48TPI	**£20**	**£52**
M7	Double/Side Double/Density 96TPI	**£27**	**£65**

DUST COVERS (For our Disc Drives)

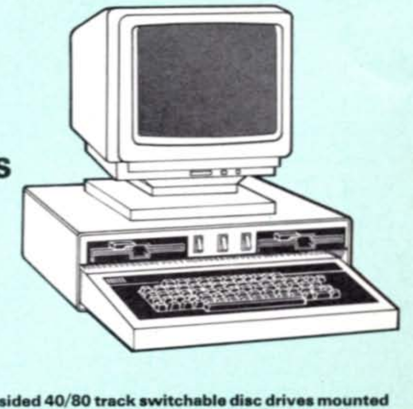
Single CLS (without PSU) **£3.20**	Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95**	Twin CD (with PSU) **£3.90**

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050;** 30 Megabytes **£1549**

CDP 800S
CDPM 800S

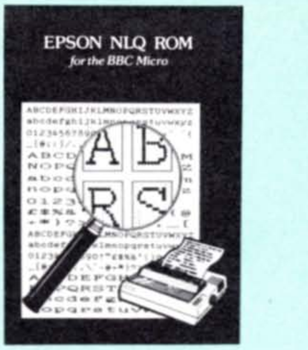


Twin 800K Double sided 40/80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £235

CDPM 800S for Master £245

(Securicor Carr. £7)



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

(Hi-View compatible)

THE NLQ DESIGNER

(The First & still the Best)

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

A 40 or 80 track (please specify) FONT Disc containing 10 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.

(P.S. This ROM is not suitable for Epson printer

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

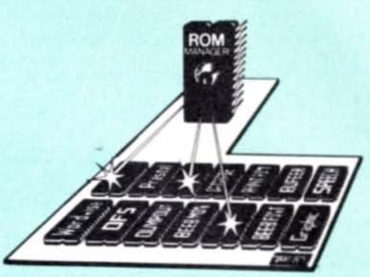
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

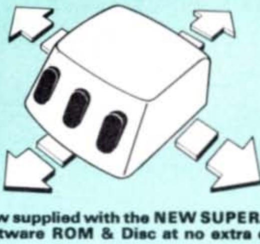
Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

FREE With every AMX Mouse package purchased from us, we are giving away, absolutely **FREE,** our popular Colour Art software package worth **£15.**

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£42**
AMX PAGE-MAKER Pack	**£42**
AMX 3D ZICON Disc	**£20**
AMX Database Disc	**£20**
AMX XAM Educational	**£20**

RB2 MARCONI TRACKER BALL

This popular unit is supplied complete with software.

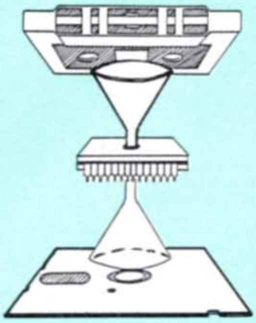
Price: **£50**

FLEET STREET EDITOR

Software pack **£35**

TRANSFEROM

(Tape to Disc Utility)



Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

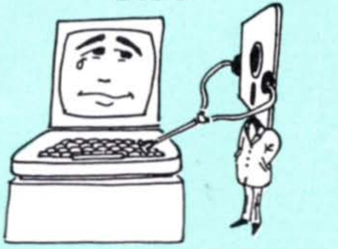
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ROM-SPELL

"way ahead of any competition"

ROMSPELL
ENGLISH DICTIONARY

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

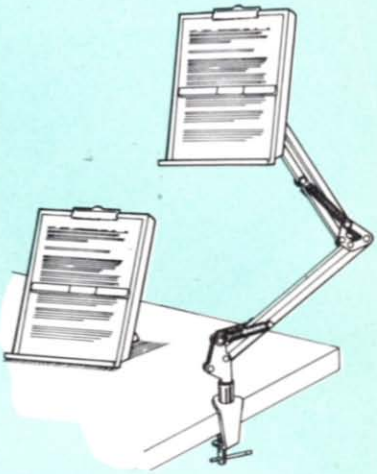
Compatible with: View, Wordwise & Wordwise

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** *(carr. £3)*

All prices in this advert are exclusive of VAT.

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

DISASSEMBLER ROM

ONLY **£16**

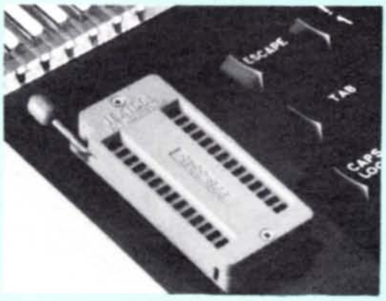
THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

Continued ⟶

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the Keyboard.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

Complete System	**£12**
Spare Cartridges	**£2.50**
Spare Rack	**£1.50**

16K Sideways RAM Modules

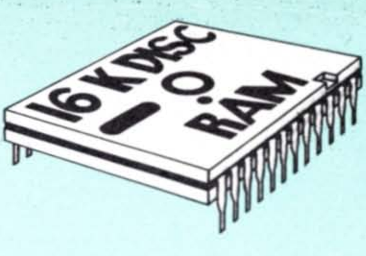
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches	**£2** each
Battery for Battery Backup	**£3**



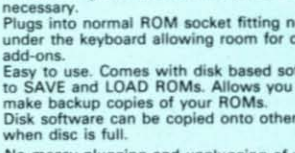
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

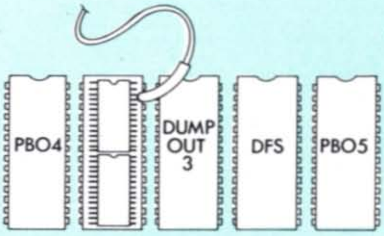
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

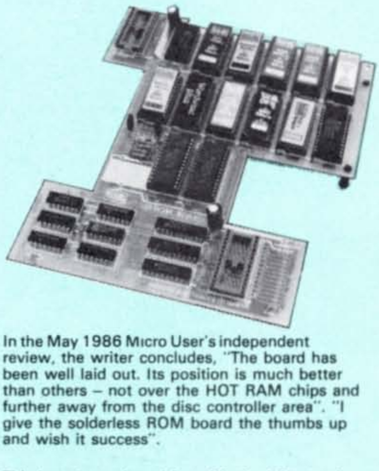
Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

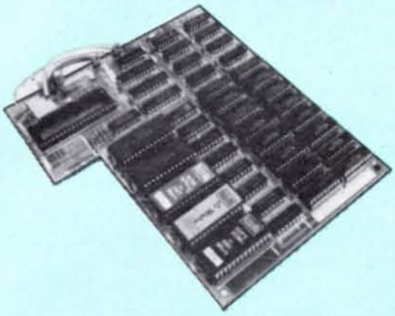
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£43***
● *ROM/RAM card with 64k dynamic RAM*	***£59***
● *ROM/RAM card with a massive 128k dynamic RAM*	***£89***
(carriage on ROM/RAM Card £3)	
OPTIONAL EXTRAS:	
● *16k plug-in Static RAM kit*	***£6***
● *Battery backup*	***£3***
● *Read and Write protect switches*	***£2 each***
Complete ROM/RAM board (all options installed)	***£99***
● *16k Dynamic RAM for Upgrade*	***£7.50***

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- ***Auto Dials, Auto Answers, and is completely controlled by your Micro. There are no external controls!***
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple "*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to MicroLink.*

- *BT Approval applied for.*

Price: **£89**
(carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£99
(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £87**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board (non BABT)	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

APOLLO

The NEW Modem from Wtford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost – High Performance modem with Auto Dial & Auto Answer facilities as standard; we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agrée that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200/1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.

The Apollo is attractively finished in matt black. It opens the doors to world communication to boht, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Special Launch Price: **£75 (Carr £3)**
(Write in for full specification)

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42 (carr. £4)

BT TELEPHONE CONNECTORS

LJU	1/4A Mini Line Master	**£4.50**
LJU	1/6A Mini Line Slave	**£3.00**
LJU	2/4A Line Master	**£4.00**
LJU	2/6A Line Slave	**£2.50**
LJU	3/4A Flush Master	**£3.95**
LJU	3/6A Flush Slave	**£2.75**
LJU	10/3A Dual Splitter	**£5.50**
	4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£27
Graphics ROM	£23
Disc Doctor ROM	£24
TERMI	£27
COMMUNICATOR	£49
SPEECH ROM	£26
Printmaster	£24

Wordwise £25

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET £40

INTER-CHART

ONLY: £26

Inter-WORD

Only: £46

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

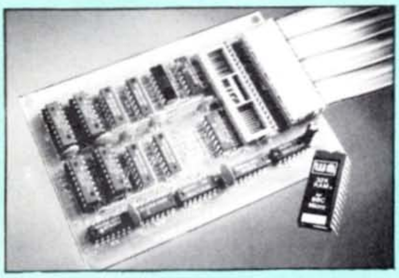
Only: **£39**

All Prices Exclusive of VAT

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B+ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM).

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computor Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£37**

VIEW 3.0 ROM

Price: Only **£56**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL	**£29**
VIEWPLOT Disc	**£22**
VIEW-INDEX	**£14**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

SPECIAL OFFER

Acorn's Speech Synthesiser Package

Complete with manual in its original packaging

Clearance price Only: **£19**

ARIES CORNER

Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of it's continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double densitv disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

The Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many othr applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) sofket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on he board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234/33383

النور

ARABIC ROM

for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

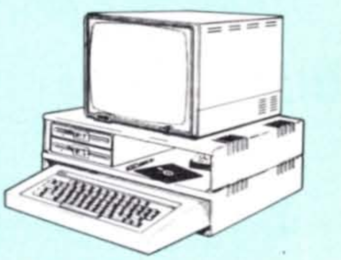
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
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The popular Database, Spreadsheet, Beebplot and Wordprocessor on Disc
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OFFICE MASTER

The popular Cashbook, Final Accounts, Mailist, Easiledger, INvoice & Statements and Stock Control
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Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

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Life & Business Organiser

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

D D D Suite Integrated Software System

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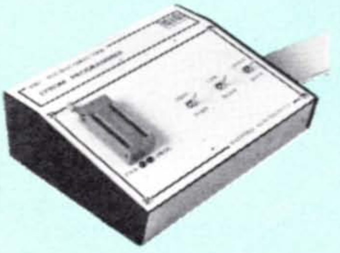
EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
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- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc/Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

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The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

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DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

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Alpha Computer Co.
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ECD BV, Voldersgracht 26, 2611 EV Delft, Holland.

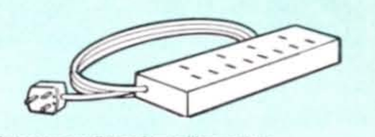
SCIENTEX P.V.B.S.
Zilversmidstratt 2, B-2000 ANTWERPEN Belgium. Tel: 03 233 59 06.

TECHNO-MATIC DATA
Holdergsgade 19, 1057 KOBENHAVN K, Denmark.

Velobyte, Schiedamzedijk 5a-6a, 3011 EB. Tel: (010) 413 8197/414 5171.

Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark. Tel: 08 642522.

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug. **£9.50** (carr £1.50)

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BBC B, B+ & Master Compatible

(We have inspected a Music 5000 unit and to our surprise we found it to be the same as Music 500 unit. Only the front panel and the software are different. Can anyone help us to solve the mystery?)

£72 *(carr £4)*

Software Disc 'Mu-500'
has 13 tunes **Only: £6**

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Prestel software plus junk mail, and all for a song

By
MIKE MAHON

ONCE over the shock of the strange name I soon realised that Weirdbeard and its companion Junkmailer form an excellent set of utilities for BBC Micro users who access Prestel and Prestel mailbox facilities.

A price of less than £10 is amazingly cheap for Prestel terminal software, let alone the accompanying mailbox editing utilities.

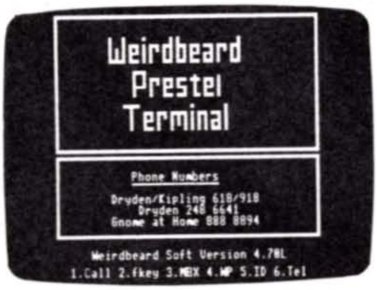
The versions I had for review were tested on a BBC B with and without a 6502 second processor and using Pace's Nightingale modem.

The package, which is available on either 40 or 80 track disc, is loaded by autobooting the disc and is fully menu-driven although a 20 page manual is also included. Much of the information is also available from the disc as an on screen Help file.

Once having configured the disc with your own Prestel ID, future logging on to Prestel is simple – almost like having an autodial modem. Another nice touch is the provision of a screen clock which keeps track of your access time.

The 10 BBC function keys are used for a variety of facilities such as saving, loading and printing Prestel frames, tagging up to 20 frames, downloading programs, reveal and conceal character options, and to send or store mailbox messages. Stored frames are also retained after logging off and can therefore be read off-line.

All these utilities worked very well though the provision of a function key strip guide would have been most helpful. In particular the fast text print option is a very useful feature, for example in recording train timetables or addresses. I did, however, miss having a "Goto previous page" option which has got me out of many a bad turn in Prestel in the past.



```
Weirdbeard
Prestel
Terminal

Phone Numbers

Dryden/Kipling 618/918
Dryden 248 6641
Gnome at Home 888 8894

Weirdbeard Soft Version 4.78L
1.Call 2.fkey 3.MBX 4.WP 5.ID 6.Tel
```

Unusually for much BBC Micro software, and especially for terminal software, Weirdbeard is compatible with the 6502 second processor and can therefore make good use of the extra memory in creating and storing large numbers of mailbox messages.

Up to 48 frames can be stored, for saving or editing, using the second processor compared with 13 on the standard BBC Micro.

Mailbox frame editing is the key feature of this terminal software as it allows you to prepare and edit mailboxes off-line, even using a word processor, and then to split the message up into frame sized units for subsequent uploading to Prestel in a single batch.

The mailbox editor allows the inclusion of all the colour codes, graphic characters, flashing and double height text in mailbox screens and also right justification to tidy up the appearance.

The editor also allows parts of a mailbox to be marked and stored and used later in creating another frame.

A particularly useful function key command enables an on screen mailbox number to be tagged and stored for later automatic entry into an outgoing mailbox address. This saves hunting for scraps of paper to store the number, or even worse forgetting it.

Further facilities include the ability to program the function keys, for example to store often-used Prestel page numbers. In addition, your most frequently used terminal phone numbers can be displayed on the front page as a reminder following autoboot.

Various computer operating system commands (BBC star commands) could also be employed from the terminal software using the Ctrl key, for example to have a peek at the disc catalogue.

In summary, I found this excellent and inexpensive software easy to use and fairly comprehensive in facilities particularly with regard to mailbox usage.

The simple fact that it is on disc and therefore readily transportable between machines as well as providing an auto log-on feature makes it very user friendly.

I certainly did not think that the disc with the weird name would take over from my usual Prestel terminal software ROM after only one session of use.

Junkmailer is available as an optional extra to Weirdbeard, but at the price, I would recommend you buy it along with the terminal software outright.

This is the facility that you always knew must exist somewhere because of all the advertising frames which appear in mailboxes that log-on to Prestel.

As with the terminal software, Junkmailer will run on the 6502 second processor attached to the BBC Micro and can make use of HiBasic so that up to 6400 numbers may be stored and used instead of 1500 on a standard machine.

I will take the author's word for the latter figures, as I don't know enough people on Prestel to try it out though I do know someone who has.

Junkmailer also has built-in error trapping features which allow you to set the number of retries when sending a mailbox, plus an auto log-off and manual abort. The software also records where in the list it was up to prior to log-off.

You do, however, have to set up a special disc file to receive the mailbox number lists, and care has to be taken to avoid some of the limitations of the old fashioned disc filing utilities of the BBC Micro.

This is another value for money product and is a recommended buy. I can only say that non-BBC Micro users will feel deprived. ■

Product: Beebaid
Price: £34
Supplier: Jaysoft, 114 Kingsway, West Wickham, Kent BR4 9JQ

A database of filenames – familiar but much refined

JIM NOTMAN reviews an old friend under a new name

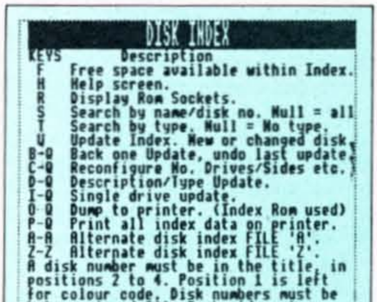
AS soon as I'd inserted this eprom into a paged ROM socket and typed in *HELP AUTO to see the various commands, BeebAid looked familiar. It was previously known as the Index Utility Package from the Data Store and ATPL – Advanced Technology Products Ltd.

The package, updated and refined, consists of a 16k eprom, a 40/80 track disc and two A5 spiral-bound manuals.

The indexing system, designed for use with Acorn's DFS, creates a database of disc filenames on disc and also in RAM if sideways RAM is present.

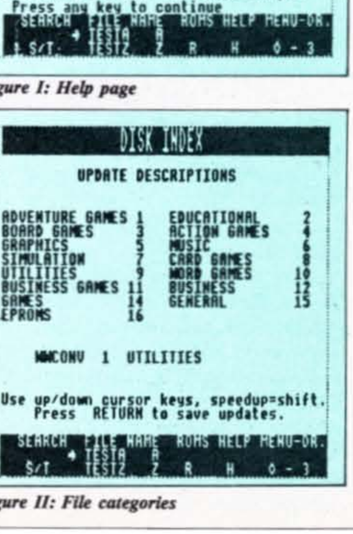
The software is supplied on disc, but before using the program for the first time a working copy must be made and configured for your system with the number of drives and whether they are single or double sided.

Once prepared the working copy can be run by pressing Shift+Break. Commands are entered as either single or double keypresses. The Help page – Figure I – is displayed by pressing H.



```
                DISK INDEX
KEYS       Description
 F    Free space available within Index.
 H    Help screen.
 R    Display Rom Sockets.
 S    Search by name/disk no. Null = all
 T    Search by type. Null = No type.
 U    Update Index. New or changed disk.
B-@   Back one Update, undo last update.
C-@   Reconfigure No. Drives/Sides etc.
D-@   Description/Type Update.
I-@   Single drive update.
O-@   Dump to printer. (Index Rom used)
P-@   Print all index data on printer.
A-A   Alternate disk index FILE 'A'.
Z-Z   Alternate disk index FILE 'Z'.
A disk number must be in the title, in
positions 2 to 4. Position 1 is left
for colour code. Disk numbers must be
between 1 and 200. Each side unique.
 Press any key to continue
 SEARCH  FILE NAME  ROMS HELP MENU-OR.
        → TESTA  A
 S/T      TESTZ  Z    R    H    0 - 3
```

Figure I: Help page



```
                DISK INDEX

         UPDATE DESCRIPTIONS

ADVENTURE GAMES 1   EDUCATIONAL      2
BOARD GAMES     3   ACTION GAMES     4
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BUSINESS GAMES 11   BUSINESS        12
GAMES          14   GENERAL         15
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     WWCONV  1  UTILITIES

Use up/down cursor keys, speedup=shift.
     Press  RETURN to save updates.

 SEARCH  FILE NAME  ROMS HELP MENU-OR.
        → TESTA  A
   S/T    TESTZ  Z    R    H    0 - 3
```

Figure II: File categories

The indexing system uses the disc titles to identify each disc, so they must be set in a way the program understands. The first character may be either a teletext character – not allowed on the more recent versions of the DFS – or a space.

This is followed by a number in the range 1 to 200. You may use the remaining eight character positions as you wish. Each side of a double sided disc should be given a different number.

The software can also cope with a twin directory system like Computer Concepts' Disc Doctor. Here each catalogue title from the same side of the disc should be given the same number.

There is some control over which files are catalogued, either all of the files or only those from given directories.

As a further aid to identification each file may have a description added to it. There are 15 different categories – Figure II – but I would have preferred a facility to modify and add extra categories. The writers seem to be a superstitious lot with no number 13.

Once created, the database may be quickly searched for a program by name or by category. This may not be the most exciting utility ever written, but it does help with that awkward task of keeping track of programs and discs.

To make the most of the other utilities which are on the ROM you really need paged RAM since BeebAid was written to help utilise ROM boards and any paged RAM that is fitted.

It is designed to be used in the most significant paged ROM socket and incorporates a disparate group of functions, including a ROM and memory manager, disc and Tube utilities.

The main commands are listed in Figure III. Command names may be prefixed with a J to help avoid any clashes.

To complement the action of the system *SINDEX will search a disc index file which has been loaded into paged RAM. This is loaded into the top half of paged RAM – &A000 to &BFFF – so that 8k ROMs may still be loaded into the bottom half.

Among the commands to manage ROMs *RDISPLAY will list all ROMs in the machine. The operating system normally maintains a map of the ROM sockets in memory. When ROMs are disabled with *RSOFF and re-enabled with *RSON this ROM map is altered.

BeebAid keeps a copy of the ROM map in paged RAM which, unlike the normal operating system map, is not altered when the Break key is pressed.

If you have battery back-up for the paged RAM these settings will be stored, just like the Master. Copies of ROMs may be saved on to disc with *RSCOPY.

In addition to the ROM management commands there are a number of commands to erase sections of memory, as shown in Figure III. *ERSWITCH will erase the ROM control table, necessary if it becomes corrupted. Memory may also be moved.

*DOWNLOAD loads a file to a specified address, even if this is over the DFS workspace. *MOVE moves a Basic program in memory and *SHIFT

CLOSE	Close all open files
DFSPACE	[Drive no.] Disc free space
DOWNLOAD	[fsp] [to] Download a file
DTWINDOW	Dump text window
ERALL	Erase all &300-&BFFF
ERHHIGH	[Socket] erase &A000-&BFFF
ERLOW	[Socket] erase &8000-&9FFF
ERPROG	Erase mem.addr &300-&7FFF
ERROM	[Socket] erase &8000-&BFFF
ERSWITCH	Erase ROM control switch
ERTUBE	Erase Tube memory
MENU	[Drive] Run & Chain (+,–,B,M)
MENUL	[Drive] Load menu, Copy
MOVE	[New page] Move Basic program
NONET	Switches Econet off
QUERY	Query read/write
QLOOP	Query loop on all ROMs
RDISPLAY	ROM display
RSCOPY	[0-F / "name] ROM socket copy
RSBOFF	Disable the Beebaid ROM
RSON	[0-F / "name] ROM switch on
RSXO	[0-F / "name] ROM switch off
SHIFT	[Fr] [to] [Len]([dest socket])
SINDEX	[String] [[*]] search index
TCHAIN	Set CFS & CH.""
TRSOCKET	[Socket from][to] transfer ROM
TUBEOFF	Switch Tube off
TUBEON	Switch Tube on
TYPE	[fsp] Type any file
f0-f3+Break	Load/Copy menu drives 0 to 3
0-3+Break	Run menu drives 0 to 3
@+Break	Select the Basic Editor
C+Break	Set PAGE to &E00,CFS & CH.""
H+Break	Help screen Mode 3
I+Break	Erase all ROM/RAM sockets
J+Break	Run & Chain Menu (+,–,B,M)
K+Break	Disc free space (hexadecimal)
L+Break	Load menu, copy.
M+Break	Run & Chain menu (+,–,B,M)
O+Break	Disc free space (decimal)
P+Break	Power-up Break
Q+Break	Query loop on all ROMs
R+Break	ROM display
TAB+Break	Tube on/off toggle
W+Break	*WORD select word processor

Figure III: The main commands

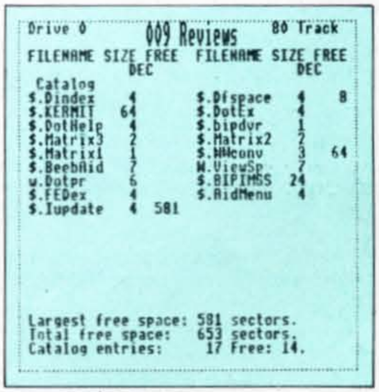
moves a block of memory. Apart from one disc command *CLOSE – which closes any open files – the other disc commands act like menus.

*DFSPACE – see Figure IV – displays more than just the free space on a disc, giving each file, the number of blocks it occupies and the position and length of any free space.

Pressing the K and O keys toggles the display between a decimal and hexadecimal count of the sectors. Pressing key C will *COMPACT the disc.

*MENUL displays the Load menu. The files of the disc in the drive are displayed with a different letter against each filename. Pressing this letter will load or *LOAD the file into memory.

If the file is in Basic it will also be listed. Pressing the Spacebar will toggle between the Load menu and the Disc Free Space menu.



```
Drive 0            009 Reviews        80 Track
FILENAME SIZE FREE  FILENAME SIZE FREE
               DEC                  DEC
 Catalog
$.Dindex     4      $.Dfspace    4    8
$.KERMIT    64      $.DotEx      4
$.DotHelp    4      $.bipdvr     1
$.Matrix3    2      $.Matrix2    2
$.Matrix1    1      $.WWconv     3   64
$.BeebAid    7      W.ViewSp     7
w.Dotpr      6      $.BIPIMSS   24
$.FEDex      4      $.AidMenu    4
$.Iupdate    4  581

Largest free space: 581 sectors.
Total free space:   653 sectors.
Catalog entries:     17 Free: 14.
```

*Figure IV: *DFSPACE*

*MENU displays the Run menu. Only files in certain directories are included, B and + for Basic programs and M and – for machine code. Pressing the appropriate letter of the menu will now load and run the program. Pressing Return toggles between the load and run menus.

A perennial problem for 6502 second processor users is initialising the correct version of Basic. BeebAid tests for the presence of the Tube and if it is active will automatically transfer the lowest priority Basic across to the second processor.

To remind you of the change in normal operation there is now a higher pitched beep when the Tube is on.

*TUBEOFF will deactivate the Tube system so you can program in the input/output processor and *TUBEON restores normal function.

Another automatic feature switches off the screen interlace, preventing the characters wobbling in graphics screen modes.

*DTWINDOW dumps the contents of the current text window to a printer – only text characters are printed. *TCHAIN selects the cassette filing system, changes PAGE to &E00 and CHAINs the first program.

Some commands may be performed by pressing a key in combination with Break. This facility has been greatly extended from earlier versions. A full list is seen in Figure III.

The software has matured and improved with time and the documentation has improved out of all recognition. However it is still a mixed bag of utilities which are competent rather than exciting.

Obviously the writers also had a problem trying to categorise this ROM, prefering to call it "a useful ROM for the BBC Micro". I'll agree with that. ■

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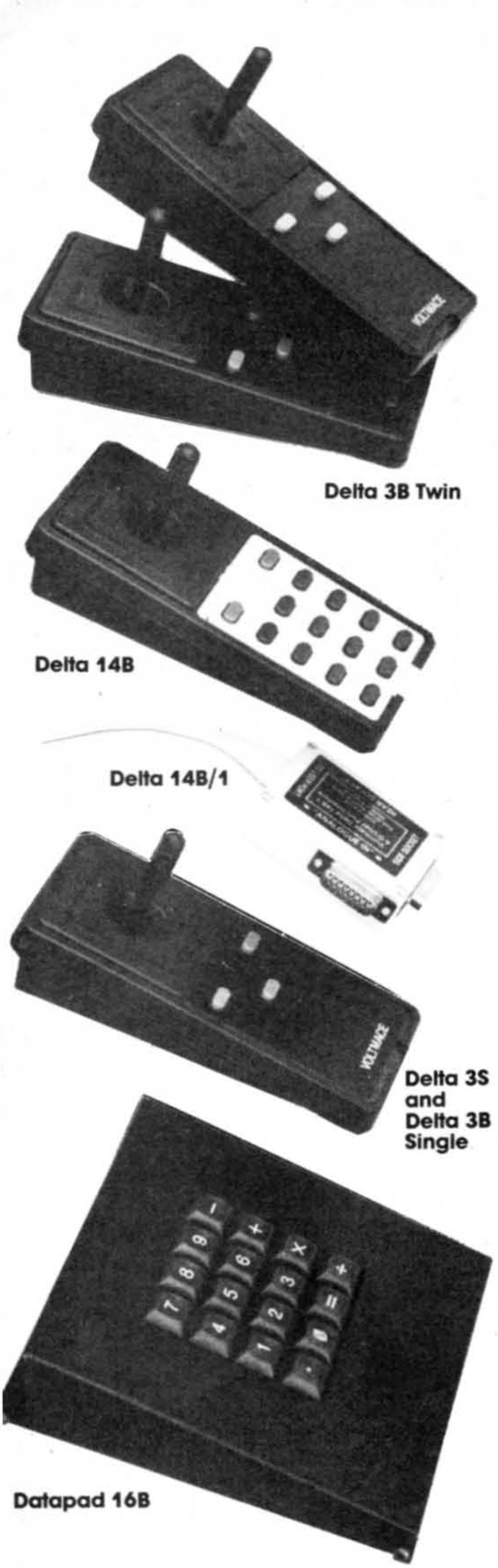

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Supplier: Technomatic, 17 Burnley Road, London NW10 1ED.

NOVACAD is a ROM-based computer aided design package – a sophisticated technical drawing system. It requires only a BBC B and single disc drive, but becomes more versatile and faster when a 6502 second processor is added or a B+ used.

It is also easier on the mind when a second disc drive is used as the frequency of disc swapping is reduced. A different, slightly more expensive version supports an AMX-type mouse, Marconi trackerball or joysticks as well as the keyboard.

Novacad comes on a single 16k eprom with an accompanying 43 page manual and a 40 track utilities disc which can be copied on to 80 tracks if needed.

Novacad operates in Mode 4 with two colours. If a 6502 second processor is attached or the machine is a B+ Modes 0, 1 or 4 with up to four colours are available. *CAD calls Novacad, offering choice of modes if appropriate, and asks for the diagram disc.

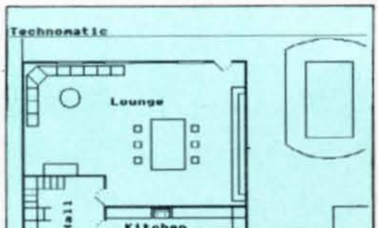
Then the drawing screen is presented in insert mode with the chosen diagram from the diagram disc. The displayed part of the drawing covers almost the whole screen although the current window occupies only two-thirds of the screen. The total drawing area is four windows wide by 5 windows high.

Novacad supports up to eight different diagrams or levels which may be superimposed on each other by judicious use of colour or dotted lines.

At the bottom of the screen are three lines of text which supply information on the number of lines, curves or characters that can be added for the memory space available. Also displayed are the current window, level, scale, colour and zoom status (see Figure I).

The cross hair or single dot cursor is moved around the screen using the cursor keys. Single keystroke commands select options such as the start point, drawing direct, drawing two lines at right angles – vertical or horizontal first, drawing arcs, or deleting a line or the nearest arc.

The radius of a selected arc can be altered by using + and – keys before it is finally placed. Keystrokes with Control choose from a number of additional modes such as zoom, copy, text, print, block delete, utilities and return to insert mode.



```
587 Lines: 486 Curves: 755 Chars
ZOOM OFF: Window: 1,2 Scale: 1.0
Levels: 0 1 2 3 4 5 6 7 Colour
```

Figure I: The drawing screen

The W key displays the window edges while Q displays the distance between the start and current cursor positions.

The zoom facility allows editing at any of 50 levels of magnification. When selected the whole diagram is redrawn in memory at the new level of magnification (Figure II), so the process can be quite slow.

One catch is that text placed in the zoom mode is eventually drawn and printed as normal sized text for the mode in use. However the coordinates of each character are retained, so allowing successive ones to overwrite each other.

Text can be placed at any of four 90 degree orientations, although the whole of it is rotated, allowing it to be read normally if the page or screen is turned.

It is impossible to enter text as a vertical column of normally oriented characters without carefully repositioning the cursor for each character.

The copy mode allows an area of the screen to be copied to other areas. Two delete methods are available – delete nearest line or arc to the cursor, or delete a block defined by a box.

Novacad also makes extensive use of icons, which are smaller areas of diagram such as individual circuit symbols or items of furniture in a house plan. They are created on the screen and saved on to a specially formatted library disc. Each icon may contain up to 500 lines, although this may take up a lot of library disc space.

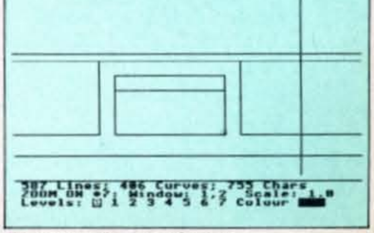
They may be called from the library using the function keys or by name, and when placed using the cursor keys they may be rotated, enlarged, reduced or mirrored left to right. The icon is finally drawn when correctly positioned by pressing Return.

Control+U selects the utilities. These clear the diagram or save the screen or whole diagram to disc. Also the whole diagram can be displayed, providing the only way that you get to see it in its entirety without printing it out.

Pressing Tab takes you to a help and set up menu. Here you can be reminded of all the commands available in insert mode or access disc files, which can be catalogued and erased.

Icon discs may also be initialised and

→



```
587 Lines: 486 Curves: 755 Chars
ZOOM ON *7: Window: 1,2 Scale: 1.0
Levels: 0 1 2 3 4 5 6 7 Colour
```

Figure II: The zoom facility

From Page 69

catalogued. The function keys – with Shift, Control or both – can be allocated to individual icons and a function key strip printed. Prescaling for Q, which tells you the length of a line in insert mode, is also set here as is grid spacing.

Finally selection of disc drives containing icons, diagrams, print files, the display colours and line formats for all eight levels are made from this menu.

The package contains an Epson dump routine which will print files from disc in one of two sizes, including all or part of a diagram.

Figure III shows a sample printout of the plan view of a house and its grounds. Technomatic will also supply an optional plotter routine which allows dumps to be made on most plotters.

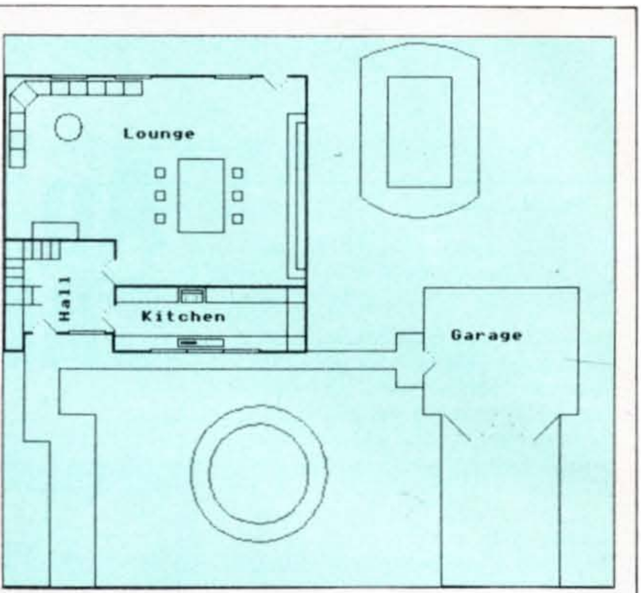


Figure III: A sample printout

The reviewed version of Novacad was 3.3. It has a language entry and will be entered at switch-on if placed in the highest priority ROM socket.

It uses workspace on pages zero and four. I have not noticed any problems with interaction with other ROMs.

In use Novacad is quite an advanced CAD package, although it is slow, particulary when used in the standard BBC B without second processor attached. However it is very reasonably priced, and as it is particularly easy to learn to use and appears to be compatible with a wide range of hardware I can recommend it. ■

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Cutting the cackle...

JONATHAN TEMPLE shows how to cram more into the BBC Micro's limited memory with this text compression technique

ANYONE who has ever attempted writing a long adventure game will know by experience the difficulty of fitting a large amount of text into the BBC Micro's rather limited memory.

So how do software houses such as Robico and Level 9 manage it? The answer lies in text compression.

That is not to say adventure games are the only use for text compression systems. Many commercial programs have to print messages, instructions and prompts, which usually need to be fairly lengthy to be helpful and user-friendly.

Unfortunately this takes up a lot of memory, and so the messages often have to be shortened to the bare minimum.

Again, there is a definite need for some sort of text compression. And what about a word processor that saved text in a compressed format for all those weary tape users?

However before we can start looking at methods of compressing text we need to know how it is usually stored.

On the BBC Micro a string can contain any character – that is Ascii codes 0-255 – with character 13 (Return) used as a terminator.

When handling strings using Basic there are also several other overheads for variable name storage and so on. Therefore some savings can be made just by using the $ indirection operator to handle strings in memory.

When looking at the actual characters that can be included in a string it soon becomes obvious that most are not needed. Codes 0-31 are control codes, which we will not need for messages, and codes 128-255 are user-defined characters or Mode 7 teletext codes.

Therefore a common technique in commercial software is to use the unwanted codes to represent collections of letters so that a whole string of letters can be replaced by just one specific code.

What sort of collections? Well words are the obvious choice, but there are several disadvantages with this. First, a large table of words needs to be built up, and second unless the words chosen are very common the compression is not really worthwhile.

However if we consider the English language it becomes clear that there are many letter pairs which are very common – for instance "th", "in", and "re". By replacing common pairs of letters with a single code, high compression ratings can be achieved. As you may have guessed, this is the technique the program presented here uses.

Using letter pairs, you might think we still need a large and cumbersome string table, this time to hold all the common letter pairs. In fact we can do it with a string of just 16 characters, as explained later.

How many characters can we limit ourself to? Well, 64 seems a reasonably good figure, and leaves 192 free for the compression codes.

Here we come to our first problem – there isn't room with 64 characters for both upper and lower case alphabets as well as all the numbers and punctuation marks we might need.

The solution is to just use the lower-case alphabet, and store a certain code before any capital letters. This code can then cause the next letter printed to be in upper-case when the message is decompressed.

Now all we have to do is set up a table of 64 values which contains the Ascii values for the 64 characters we will be using. These are then represented in the compressed message by codes 0-63.

Next we must turn to the letter pairs which we will compress. If we take the space character and roughly the 15 most common letters in the English language, we are left with the 16-character string "etaoinshrdlugcy". We store this string in memory at *table*.

When compressing a message the compressing routine searches for any of these characters. If it finds one it then checks the next character in the message to see if it is any of the first 12 in the string.

If so a code in the range 64-255 is stored in the compressed string. It is calculated from the positions of the characters in the string.

The reason only 12 of the 16 characters are checked for the second time is that since we only have 192 spare codes we cannot represent any more than 192 (16*12) letter pairs.

Obviously some of the letter pairs that can be compressed using this string are of little use. For example "ii" and "ae". Even so the string contains nearly all the common letter pairs. The technique also saves us having the 384 (192*2) byte table for the 192 pairs which would otherwise be required.

Once you have typed the Text Compression program in, save it before running as a safeguard against any disastrous mistakes. When you run the program you will be asked for the start address in hex for the decompression system and compressed text. Just enter 6000 for now.

The machine code will then be assembled. If you have made any mistake the micro will stop with a message and error number. If this happens check lines 110, 160-270, 1990-2160 and 2560-2600.

For error 1 you should also check lines 280-1090, and for error 2 the lines 1090-1980 should be checked against the listing as well.

Once the program runs properly you will be told the compression rating

→

achieved on the example text contained in it – lines 2650-2720. The compressed text should be stored in the region of 62-63 per cent of its original space if the compression routine is working correctly.

To use the program with your own messages, type in the messages (up to 255) into data lines from line 2650. Details of what characters can be used in these data lines are given in the example messages. Your entries should be terminated using an asterisk, as in line 2720.

Once it is run the program will then compress your messages and give a suitable *SAVE command which will save the decompression routine and messages in one file. You should also type:

```
PRINT "&";~message
```

and note the result.

This file can then be later *LOADed. To output one of the messages set *A%* to the message number and then CALL the message routine, using the result previously noted down previously – see above.

If you set *A%* to too high a figure a "Bad message" error will be returned by the routine. You will also need to remember that the message numbers start from zero – so the first message is number 0, the second number 1, and so on.

You can view the whole demonstration message by typing:

```
FORA%=0TO6:CALLmessage:PRINT:NEXT
```

For those wishing to use the code from machine code, just load the accumulator with the message number and the JSR to the message routine, the address of which you should have noted down. So if the message routine is at &6051 and you want to print the second message use:

```
LDA #1:JSR &6051
```

to retrieve the compressed text.

The messages are not automatically followed by a Return, so for most of them you will need to insert a PRINT statement following the CALL – or alternatively place a hash character at the end.

The Return is not automatic because for some applications – notably prompts – you might wish the cursor to stay on the same line. ■

PROCEDURES

ask	Prints title and returns start address typed by user.
assemble	Assembles machine code and sets up tables and so on – also calls check if necessary.
check	Calculates checksum for section of code.
compress	Reads in messages and calls compression routine; also prints out final information.

VARIABLES

start	Start address for system.
traphex	Flag for trapping illegal hex entries.
address	Current address during compression.
original	Original space taken up by messages.
number	Number of messages.
text$	Message read from data lines.
C%	Correct checksum.
E%	Checksum error number.
T%,M%,S%,F%	Used to calculate checksum value.
flag	General flag.
tpos	Pointer to position in compressed string.
text	Position in message table for decompression.
temp	Temporary store for compression.
char	Character currently being compressed.
string	Buffer for string to be compressed.
compstr	Buffer for compressed string.
table	Table of 16 common characters.
chars	Table of 64 Ascii codes.
compress	Compression routine.
message	Decompression routine.
comptext	Start of message table.

```
 10 REM ************************
 20 REM  BBC TEXT COMPRESSION
 30 REM   By Jonathan Temple
 40 REM (c) The Micro User
 50 REM ************************
 60 traphex=FALSE
 70 ON ERROR GOTO 2500
 80 MODE 7
 90 start=FNask
100 PROCassemble(&7000,1)
110 PROCassemble(start,0)
120 PROCcompress
130 END
140 REM ************************
150 DEFPROCassemble(start,check)
160 flag=&70
170 tpos=&71
180 text=&71
190 temp=&72
200 char=&73
210 table=start
220 chars=start+17
230 string=&900
240 compstr=&A00
250 osnewl=&FFE7
260 oswrch=&FFEE
270 FOR pass=0 TO 2 STEP 2
280 P%=&C00
290 [OPT pass
300 .compress
310 LDY #0
320 STY flag
330 DEY
340 STY tpos
350 .continue
360 INY
370 LDA string,Y
380 CMP #35
390 BNE nhash
400 LDA #0
410 BEQ code
420 .nhash
430 JSR lower
440 STA char
450 LDX #15
460 .loop1
470 CMP table,X
480 BEQ match
```

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(a) £8.50 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

DISC DRIVES

Full details on page 6.

5.25" Single Drives 40/50 switchable:

TS400 400K/640K	**£103 (b)**
PS400 400K/640K with integral mains power supply	**£114 (b)**

5.25" Dual Drives 0/80 switchable:

TD800 800K/128OK	**£205 (a)**
PD800 800K/1280K with integral mains power supply	**£229 (a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£249 (a)**

WINCHESTER DRIVES

P20 HD 20 Mbyte Hard Disc with ADFS Rom	**£669 (a)**
P204HP 20 Mbyte Hard Disc, 80T DS floppy in a monitor stand plus ADFS Rom	**£865 (a)**
P2041HT As P204HP and a 10 Mbyte tape streamer, with backup utilities plus ADFS Rom	**£1579 (a)**

3.5" 80T DS Drives:

TS351 single 400K/640K	**£99 (b)**
PS351 single 400K/640K with integral mains power supply	**£299 (b)**
TD352 Dual 800K/1280K	**£155 (b)**
PD352 Dual 800K/1280K with integral mains power supply	**£169 (b)**

DISC DRIVE MULTIPLEXER

Full specification on page 6.

TDM2 Dual Unit: 2 computers/one drive unit	**£75 (b)**
TDM4 Quad Unit: 4 computers/one drive unit	**£135 (b)**

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD	4	**£10.50 (d)**
745 40T DS DD	3	**£12.75 (d)**
746 80T SS DD	3	**£16.50 (d)**
747 80T DS DD	3	**£16.50 (d)**

(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD	3	**£20 (d)**
80T DS DD	2	**£27 (d)**

The number in green is the qualifying number for a free SWISS ARMY KNIFE while stocks last.

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	**£12.50 (d)**
3.5" Kit with 20 disposable discs	**£14.00 (d)**

DISC STORAGE BOXES

DB530 Non Lockable 30 x 5.25"	**£6.00 (c)**
DB340 Lockable 40 x 3.5"	**£8.50 (c)**
DB550 Lockable 50 x 5.25"	**£9.50 (c)**
DB570 Lockable 70 x 5.25"	**£11.00 (c)**
DB5100 Lockable 100 x 5.25"	**£13.00 (c)**

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	**£179 (a)**
Microvitec 1431AP As 1431 + composite video and sound input	**£195 (a)**
Microvitec 1451 Medium Resolution 653 pixels	**£225 (a)**
Microvitec 1451AP As 1451 + composite video and sound input	**£260 (a)**
Microvitec 1441 High Resolution 895 pixels	**£365 (a)**

Microvitec 20" RGB/PAL/ Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	**£380 (a)**
Microvitec 2040CS High Resolution RGB/Comp Video	**£685 (a)**
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	**£239 (b)**
TAXAN SUPER VISION II 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	**£279 (a)**
MITSUBISHI XC1404 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	**£229 (a)**

12" MONOCHROME MONITORS

TAXAN KX1201G Hi Res green etched screen	**£90 (a)**
TAXAN KX1202G Hi Res Long Persistence (P39)	**£98 (a)**
TAXAN KX1203A Hi Res amber etched screen	**£98 (a)**
PHILIPS BM 7502 Hi Res green screen	**£75 (a)**
PHILIPS BM7522 Hi Res amber screen	**£79 (a)**
HANTAREX HX12	**£69 (a)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	**£20 (c)**
Philips Swivel Base	**£14 (c)**
Monitor Stand Models B & B +	**£10 (c)**
Monitor Stand Master	**£13 (c)**
Double Tier stand Models B, B + or Master	**£24 (b)**
Taxan RGB Lead	**£5 (d)**
Microvitec Lead	**£3.50 (d)**
Monochrome BNC/Phono Lead	**£3.50 (d)**

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	**£37 (b)**
ATPL Battery backup kit	**£18 (b)**
RAMROM 15 for Model B. External board in an attractive case — easy access to sockets. 6502 Processor signals for development work.	**£79 (b)**
Low Profile Cartridge Module Module + 1 cartridge	**£12 (d)**
Spare Cartridge	**£2.50 (d)**
Cartridge rack	**£1.50 (d)**
TIME WARP Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	**£29 (d)**

MODEMS

(All modems are BABT approved)
See page 7 for modem specifications

MIRACLE WS2000V21/23 & BELL stds	**£102 (c)**
WS2000 Auto Dial Card	**£26 (d)**
WS2000 Auto Answer Card	**£26 (d)**
WS2000 SK1 Kit	**£5 (d)**
WS2000 DS1 disc	**£10 (d)**
WS2000 Data Cable for BBC	**£6 (d)**
MIRACLE WS4000 V21/23	**£149 (b)**
MIRACLE WS3000 V21/23	**£295 (b)**
MIRACLE WS3000 V22	**£495 (b)**
MIRACLE WS3000 V22 bis	**£650 (b)**
BBC Data Cable for WS3000	**£7 (d)**
GEC DATACHAT Modem V23 1200/75, 75/1200 & 1200/1200 pseudo f.d. line powered, complete with software suitable for connecting to Prestel, Micronet, Telecom Gold and many bbs. Special offer price	**£49 (b)**

PROGRAMMING ACCESSORIES/SOFTWARE

see page 8 for detailed specification

Compatible with B, B + and Master

EPROMER II with disc based software and rom image	**£99 (b)**
META ASSEMBLER	**£145 (b)**
PORTAL EPROM EMULATOR 256K	**£185 (b)**
PORTAL EPROM EMULATOR 512K	**£285 (b)**
EPROM ERASERS **UV1B** 6 eproms, safety cutout	**£47 (b)**
UV1T 6 eproms, timer, safety cutout	**£59 (b)**

CAD/DRAWING PACKAGES

NOVACAD CAD Package for B, B + & MASTER (See page 9 for specification)

BASIC Version	**£79 (d)**
Tracker Ball/Mouse Version (TM)	**£99 (d)**
TM Version plus Tracker Ball	**£129 (c)**
TM Version plus Mouse	**£115 (c)**
Plotter Driver Generator	**£28 (d)**

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MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£67 (d)
Super Art	£43 (d)
PAGEMAKER	£43 (d)
3D ZICON	£21 (d)
PAINTPOT	£21 (d)
DATABASE	£21 (d)

RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

SOFTWARE CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

BBC SOFTWARE/ FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb	£37 (d)
STARdataBASE A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW.	£49 (d)
MASTERFILE II Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T)	£17 (d)
GEMINI's DATAGEM A 24K database system offering large user defined record layout, multi level searches etc	£59 (c)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0 New version of VIEW compatible with B+ complete with a printer driver generator.	£56 (c)
Hi-VIEW Disc based version of VIEW 2.1 for use with 6502 2nd processor allowing upto 47K of memory for text.	£36 (d)
VIEWSPELL Acorn's new rom based spelling checking utility with a 70,000 word dictionary on 80T disc. Additional/specialised dictionaries can be created. Facilities also include wild card search for words.	£29 (d)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper.	£9 (d)
DOT PRINT PLUS Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP.	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £10 less).	£49 (d)
WORDEASE A 16K rom based utility for WW+	£24 (d)
SPELLCHECK III A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc.	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor.	£37 (d)
VIEWPLOT A disc based plotting program. (To be released soon).	£22 (d)
INTERSHEET The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc.	£39 (d)
INTERCHART Graphics package for Intersheet	£27 (d)
ULTRACALC BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc.	£52 (d)
QUICKCALC A disc based economically priced spreadsheet package (40 or 80T Disc).	£14.50(d)
MINI OFFICE II A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T)	£14.75(d)

LANGUAGES

META ASSEMBLER Multi processor Assembler full details on page 8	£145 (c)
ACORN 6502 DEV. PACKAGE A macro assembler with utilities for developing large programs in assy lang. Requires 6502 2nd processor.	£43 (d)
MACROM A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory.	£33 (d)
ACORN MICRO PROLOG Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly.	£62 (d)
ISO-PASCAL Acorn's full implementation of International Std Pascal on 2x16K roms.	£48 (c)
ISO PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL A fast P-code compiler and stand alone utility (40 or 80T).	£36 (d)
BCPL	£46 (c)
BCPL CALCULATIONS Supports floating point, fixed point and fast integer calculations on BCPL	£17.50 (d)
BCPL STAND ALONE GENERATOR	£39 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT A frame based authoring system from NPL for interactive computer tutoring. Disc based	£52 (c)
MICROTEXT PLUS Extended Features incl extra memory, control of external devices etc. Rom based.	£229 (b)

COMMUNICATIONS

TERMULATOR Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations.	£25 (d)
COMMSTAR A highly popular communication rom suitable for all general purpose applications (specify B or Master)	£28 (d)
COMMUNICATOR A full 80 col VT100 emulation program with easy to follow screen menus.	£49 (d)
DATABEEB A variety of facilities for use with WS2000 Modem	£26 (d)
DS1 DISC Special utilities for use with WS2000	£10 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£22 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual Cassette	£9.50 (d) £9 (d)
EXMON II	£23 (d)
HELP II	£25 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£22 (d)
PRINTMASTER	£24 (d)
DUMPMASTER supports about 40 printers	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
BILLBOARD	£18 (d)
STUDIO EIGHT	£19 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
CC SPEECH ROM	£28 (d)
CC SPEECH ROM to Text Rom	£34 (d)
ACORN SPEECH ROM	£15 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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(a) £8.50 (Datapost)
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BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programs by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY:
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

COMPUTERS AT WORK:
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

PICTURE CRAFT
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

DRAWSTICK
8 year upwards for creating pictures, charts, maps etc. Pictures created can be used in your own programs. Sufficiently sophisticated for use by adults. **Cass £8 (d)**

INTRODUCING GEOGRAPHY
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

MATHS WITH A STORY 1
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

MATHS WITH A STORY 2
Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

NUMBER GAMES:
6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

USING YOUR COMPUTER
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

WORD PLAY
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

WORD MOVER
A simple text editor. **Cass £8 (d)**

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

ADVANCED STUDIES: GEOGRAPHY
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

INSIDE INFORMATION
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres. **Prog Cass £10 (d)** **Audio Cass £5 (d)** **Book £8 (d)**

OPEN LOGO
Open University Logo incl two 16K roms and two manuals. **£55 (c)**

SCIENCE TOPICS (ST)

S.T.: WAVES
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

S.T.: RELATIONSHIPS
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

S.T.: BONDING
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

S.T.: ELECTROMAGNETIC SPECTRUM
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

S.T.: ELECTRONICS IN ACTION
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

S.T.: NEWTON & THE SHUTTLE
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

S.T.: ECOLOGY
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

S.T.: POLYMERS
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

S.T.: CLASSIFICATION & PERIODIC TABLE
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

S.T.: FOOD & POPULATION
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

SEC. SCIENCE: MICROTECHNOLOGY
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

SEC. SCIENCE: THE MOLE CONCEPT
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

SEC. SC.: UNIFORMLY ACCELERATED MOTION:
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

VU-TYPE
The popular 'Sight & Sound' touch typing tutor with alterable settings. **Disc/EC £15 (d)**

GENERAL

GAME CORE
Provides information and intelligence routines for writing board games. **Cass £9 (d)**

VU TYPE PROFESSIONAL
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

WHITE KNIGHT MK II **Disc £16 (d)**

BATTLEFIELDS **Cass £8.50 (d)**

A VOUS LA FRANCE
A home study aid for anyone learning French. **Cass/EC £12 (d)** **Book £5.25 (d)**

DEUTSCH DIREKT
Disc based vocabulary learning prog with audio cassette to help with pronounciation. **Disc/aud/EC £16 (c)** **Book £5.95 (d)**

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per cassette, please specify the format required.

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£28 (d)
8148 + RS232 + 8K	£75 (d)
8165 IEEE + Cable	£65 (d)
8148 RS232 + 2K	£57 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£37 (c)
FX80/80 + Paper Roll Holder	£17 (c)
LX80 Tractor Feed	£20 (c)
LQ800 Tractor Feed	£44 (b)

SHEET FEEDERS:

8338 LX80	£49 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
8330 RX80 +	£129 (b)
LQ800	£129 (d)

Ribbons:

RX/FX100/100 + . FX105	£10 (d)
RX/FX80/80 + , FX85	£5 (d)
LX80	£4.50 (d)
H180 Pen Set (Aqueous/Ball point)	£7.50 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	£7.50 (d)
KP910	£7 (d)

TAXAN CANON Accessories:

RS232 + 2K buffer	£78 (d)
Ribbon	£6 (d)

JUKI 6100

RS232 Interfaces	£65 (d)
Tractor Feed	£129 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£182 (a)

BROTHER HR15

Daisy Wheel	£18 (d)
Tractor Feed	£90 (a)
Ribbon (Carbon/Nylon)	£3.00 (d)
Sheet Feeder	£182 (d)
Keyboard	£135 (a)

Printer Leads:

BBC Parallel Lead (1.2m)	£6 (d)
BBC Serial Lead (1.2m)	£6 (d)

Other lengths can be supplied on order:

IBM Parallel Lead (2m)	£12 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

2000 sheets 9½" × 11"	£13 (b)
2000 sheets 14½" × 11"	£18.50 (£4.50)

Labels/1000:

Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 27/16" × 17/16"	£5 (d)

BBC SPARE PARTS

All Prices are Retail ex-VAT

BBC & Misc:		8271	£46	74LS10	£0.24
Keyboards	£52	88LS120	£3.00	74LS123	£0.80
Powers Supply	£52	**BBC PLUS:**		74LS163	£0.75
Keyswitch	£1.75	PAL16REN	£13.50	74LS244	£0.80
Video ULA	£18	64K × 4 DRAM	£8.50	74LS245	£1.10
Serial ULA	£14	6512A	£12.50	74LS373	£0.90
DNFS	£18	SAA5050	£9.00	74LS393	£1.00
UHF MOD	£4.50	6845SP	£6.50		
6502A CPU	£6.50	UPD7002	£5.00	**BBC MASTER:**	
65CO2 CPU	£12	DS3691	£3.50	1-Mbit ROM	£39
6522 VIA	£3.50	7438	£0.40	MSI CHROMA	
6522A VIA	£5.50	74LSOO	£0.24	IC	£13.50
LM324	£0.45	74LSO4	£0.24	65SC12P-2	£12.50

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THE BBC
MASTER SERIES
MICROCOMPUTER

For price details see page 1.

Compact
BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

THE FAMILY COMPUTER

Now available from stock

This low cost high tech computer has developed specially as a computer for home use.

SPECIFICATION

128K RAM, ADFS Filing system, BBC Basic version 4, MASTER style keyboard, a single 640K 3.5" double sided drive. RGB/Mono Monitor as an optional extra.

Bundled software pack includes: Desk Top Prog with note pad & calculator, VIEW 3.0, Card Index, LOGO & LOGOTRON. A set of exciting games and graphic demos.

ACW443 CAMBRIDGE WORKSTATION

- A complete self-contained workstation.
- 'Bundled' software as 32016 co-processor.
- 8Mhz NS32016.
- 20Mbyte Winchester + 1 400K Floppy Drive.
- 4Mbyte RAM as standard.
- Hi-Res Monitor *Detachable keyboard.
- **Phone for detailed leaflet.**

PHONE FOR DETAILS OF RANGE OF 32BIT SOFTWARE NOW AVAILABLE

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to your BBC.

- 6 Mhz. NS32016 CPU
- NS32081 Floating Point Processor.
- Bundled' languages including: Fortran-77, Pascal, C, Cambridge Lisp, 32016 Assembler, 32Bit BBC Basic.
- 1Mbyte RAM fitted as standard.
- **Phone for detailed leaflet.**

STAR NL10

A 80 col 120 cps printer with fine NLQ at 30 cps offers novel and innovative features. There are no dip switches to set, full control from the front console. Plug in interface cartridge simplifies adaptation to different computers. Friction & Tractor feed as standards. Epson Compatible Graphics.

NATIONAL PANASONIC KX P1080

A high performance low cost printer with full character pitch feature 10, 12, 15 & 17 cpi and proportional spacing in both draft and NLQ mode. 80 column, 100 cps draft and 20 cps in NLQ. Parallel interface and Friction and Tractor feeds as standard. Epson Compatible Graphics.

EPSON LQ800

Uses top quality 24 pin dot-matrix technology.

- Superb 'letter quality' at 67cps.
- Fast clear draft quality at 200cps.
- LQ/Draft modes selectable from front panel.
- Variety of fonts, usable in both draft & LQ modes.
- Optional 'personality' modules for Diablo and IBM emulation.
- Optional Font modules.
- Friction feed.
- Hi Res bit image graphics with hex density.

512 CO-PROCESSOR

Brings professional software to the BBC Master.

- 10 Mhz 80186 *DOS PLUS.
- GEM Write & GEM Draw.
- 'WIMP' Environment with high quality Mouse.
- Runs many 'IBM' programs — even 'Flight Simulator'!
- Convert to/from IBM/BBC data.

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

- Built-in character font generator.
- Built-in view printer driver.
- Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
- True bold print as well as double width.
- 12 character pitch as standard.
- Fully variable pitch and line spacing.
- Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
- **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
- **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

```
homes of a ruling class whose right to
rule was based on the ownership of
land. Large estates produced money;
perhaps even more important, they
supplied people to fight for their
```

NORMALLY JUSTIFIED TEXT

```
homes of a ruling class whose right to
rule  was  based  on  the ownership of
land.  Large estates  produced  money;
perhaps   even   more  important, they
supplied people  to  fight  for  their
```

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

EPSON HI-80

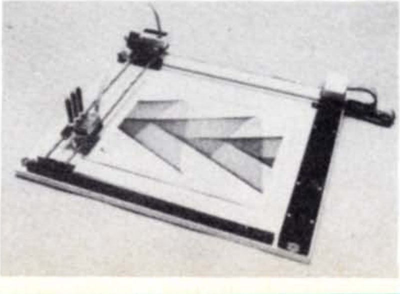
- Low cost while maintaining precision.
- A4 with 4 colour precision plotting.
- Variety of pens available.
- Ideal for overhead transparencies.
- Powerful software commands allow complex plots.
- Superb line/bar/pie charts simply produced.

HITACHI 672 PLOTTER

- A3 four colour precision plotter.
- Serial and parallel ports as standard.
- Produces 'OHP' transparencies as well as plain paper.
- 'HP' graphics language or single character commands.

GRAPHICS WORKSTATION

A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.



OPTICAL SENSOR

This converts the plotter into a input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

DRILL/ROUTER

This will drill holes, machine moulds and cut complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

SCRIBER

The sharp pointed scriber may be used to etch fine line drawings on surfaces such as scraperboard, wax coated copper etc. Full details on request. See page 1 for price.

All accessories available separately if required.

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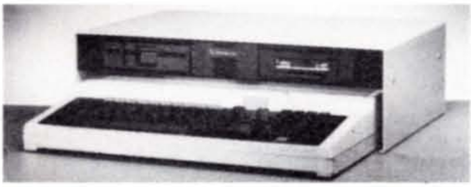
TS 400

PD 800


P2041 HT

PD 800 P

DISC DRIVES

TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

*Mass storage 20 Mbyte drives are available in the following versions:

- P20HD Stand alone.
- P204HP With a single floppy housed in a plinth version case.
- P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.

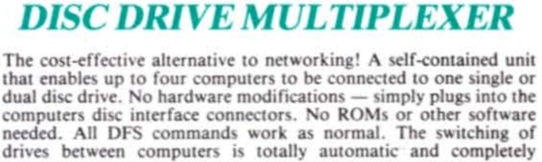
All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

ALL TECHNOMATIC DRIVES CARRY A TWO YEAR WARRANTY AS STANDARD

(Effective 01.08.86)

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



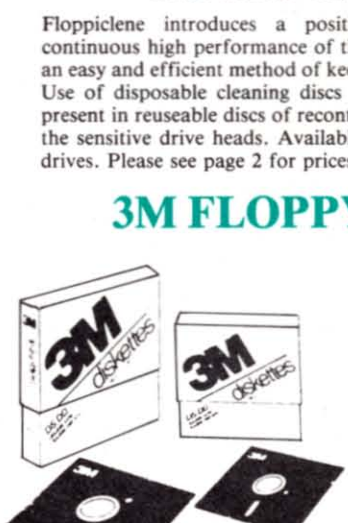
TDM4 Quad Unit (up to 4 computers)
TDM2 Dual Unit (2 computers)

FLOPPICLENE

Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25" and 3.5" drives. Please see page 2 for prices.

3M FLOPPY DISCS



3M are the worlds largest producer of magnetic media and are acknowledged as leaders in magnetic media technology. Every single 3M Floppy Disc carries a written lifetime guarantee that it will perform reliably. Not only do 3M offer a highest quality product but also a very competitive price. Please see page 2 for details. 3M Floppy Discs are supplied in sturdy storage boxes each containing 10 discs.

LEADING SUPPLIER TO THE BBC MARKET
ESTABLISHED OVER 15 YEARS

TECHNOMATIC

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305 Edgware Road, London W2 Tel: 01-723 0233

MODEMS

MIRACLE WS4000

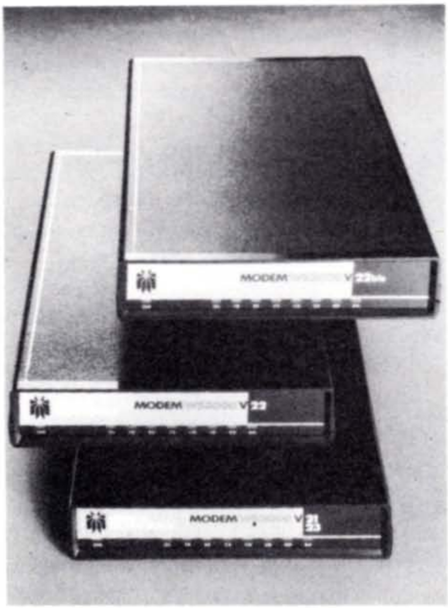
- A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
- Plain English commands make it simple to use, even for the first time user.
- Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
- Equalisation model in V23 for line-noise filtering.
- Many other options including upgrading to V22 and V22 bis.

MIRACLE WS2000

- A comprehensive manually switched 'World Standard' modem.
- Competitively price with a capability to be upgraded for various options.
- BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
- Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).

- SK1 chip set for computer control.
- User port cable.
- Auto dial Board.
- Auto Answer Board.
- DS1 disc for auto dial facilities on Commstar.



WS 3000 Range

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.

Please see page 2 for prices

MIRACLE WS3000 RANGE

- A professional range of intelligent modems with full BABT approval.
- Auto Answer and Auto Dial facilities installed as standard.
- HAYES protocols implemented.
- Pulse or DTMF 'tone' dialing.
- Plain English command structure simplifies the use of the modem.
- Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
- A line sharing facility to differential between data and voice calls.
- Intelligent speed buffering converts 1200/1200 terminals to 1200/75
- Equalisation mode for line noise filtering.
- Internal battery back up for storing 63 names, numbers and default settings.
- Upgrade path for 1200/1200 and 2400/2400 and security encryption.
- Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400.

MULTIFORM Z80

includes a FREE Pocket Wordstar package

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.

- It is capable of running most CP/M 2.2 format applications programs on the BBC.
- Connects to the BBC via 1MHz bus, no restriction on the cable length. OS/M operating system on rom.
- Integral mains psu and 64K on board ram.
- 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
- Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
- Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M .
- Multiform is fully compatible with Acorn's 8271 and 1770 DFS on models B, B plus and the Master.
- Single density dfs allows single density CP/M format use. Double density dfs allows both single and double density CP/M formats to be used.
- Single or dual, single sided or double sided and 40 or 80 track drives can be used provided that they match the CP/M software format to be run.
- Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
- Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
- Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

Please see page 1 for prices

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Now supports Acorn ADFS Programs 27256 in single pass

EPROMER II

Eprom Programmer for the BBC Micro Series

EPROMER II
TECHNOMATIC LTD

Epromer is supplied with a integral mains psu, all the necessary cables, a manual and software on disc. Disc also contains the rom image for use with sideways ram. Rom based software is available as an optional extra if required.
Epromer is fully compatible with Acorn DFS on the BBC B, B+ and the MASTER. Please see page 2 for price.

- A sophisticated Eprom Programmer that uses the latest Eprom Programming technology to simplify the use of the programmer and at the same time allowing the programmer the full control of the programming process.
- It handles the full range of popular single rail Eproms up to 27256.
- Powerful menu driven software makes the programming of eproms simple and efficient.
- Selectable programming voltage 25/21/12.5V.
- Two programming option, standard and algorithmic for eproms capable of high speed programming. 27128 can be programmed in just over 2 mins.
- Single address to full eprom address selectable for any of the epromer function ie blank check/read/burn/verify.
- Full screen editor with input in hex or ASCII.
- Software interface for special programming requirements eg programming alternate bytes etc.
- Many other useful utilities included.

Please send for full specification sheet.

META VERSION THREE

The only package available in the micro market that will assemble 27 different processors at the price offered. (Please see page 2).

Now Available

- **Assembly for even more processors**
- **Now over 70k long on 2 16K Roms and 2 Discs**
- **Dozens of new options, features and directives**

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.
Now there's an even better version. It is supplied on two 16K roms and two discs and it is fully compatible with all BBC models including Master and gives you complete Editing and Assembly facilities for all the listed processors:

1802
HD 64180
Z80
6502 (including *all* CMOS varients)
65C812
65C816
6800
6802
68HC11
68000
8048 Series
8051 Series
8080
8085
Z8
68120
68121
6808
6301
6303
6305
6801
6803
6805
6804
6809

META uses the appropriate standard mnemonics for each, eg. LD (HL), 0ABH in Z80 and MOVE. B DO, $50 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmatic (incl. MUL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

Send for your detailed spec sheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon.

Please specify the computer type when ordering.

PORTAL EMULATOR

- Provides real time emulation of all listed eproms at 150 ns.
- Totally software driven by (META).
- Compatible with 'piggyback' processors.
- Upto 4 portals can be used on the same BBC lead.
- Each PORTAL has a lead terminated with a 28 pin header to plug into the socket you need to emulate.
- Various options available for sending code: eg use two PORTALS for 16 bit data bus with sequential PORTAL skipping.

PORTAL is available in two versions:

PORTAL 128 for 2716, 2732, 2764, 27128.

PORTAL 512 for all of the ones listed above + 27256 and 27512.

BOOKS

No VAT
Carriage
Code
(c)

LANGUAGES	
6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPL User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
S-PASCAL	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The UNIX Book	£7.50
Unix User Guide	£19.95
Understanding Unix	£18.45
BBC MICRO GUIDE BOOKS	
BBC User Guide Acorn	£15.00
BBC Plus User Guide	£15.00
Drawing your Own BBC Programs	£6.95
Inside Information	£8.95
Math Prog in BBC Basic	£7.95
Toolbox 2	£10.95
Turtle Graphics	£7.50
VIA 6522 Book	£4.50
PROGRAMMING/UTILITY	
Advanced User Guide	£12.50
Applied Ass./Lang on the BBC	£9.95
BBC Micro Sideways ROM's RAM's	£9.95
BBC Micro Sideways Roms B. Smith	£9.95
Guide to the BBC ROM	£9.95
Beginners Guide to W.P	£7.95
View 3.0 User Guide	£10.00
Viewstore	£10.00
Viewsheet	£10.00
Wordwise Plus	£9.95
SOUND & GRAPHICS:	
Advanced Graphics with BBC	£6.00
Creative Sound on the BBC	£9.95
Mastering Music	£6.95
DISC DRIVE SYSTEMS:	
Advanced Disc User Guide	£14.95
BBC Micro Disc Companion	£7.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
APPLICATIONS:	
Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
PROFESSIONAL SOFTWARE	
Wordstar made easy	£16.95
Introduction to Wordstar	£17.95
Wordstar Handbook	£11.95
dBase-II for the first time user	£16.95
Understanding dBase-III	£22.95
Multiplan Made Easy	£18.95
Multimate Complete Guide	£16.95
ABC of LOTUS 123	£17.45
1-2-3 for Business	£16.95
Adv Tech in dBase II/III	£22.95
Mastering CP/M	£17.95
CP/M Bible	£16.50
Introducing CP/M on BBC & Z80	£9.95
MS/PC DOS Prompt	£10.95

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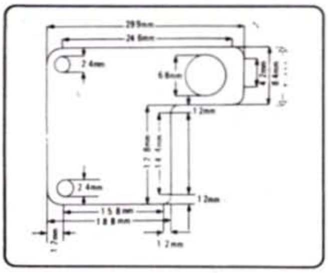
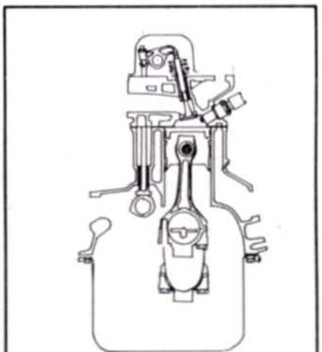
NOVACAD

Computer Aided Draughting for the BBC Micro

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

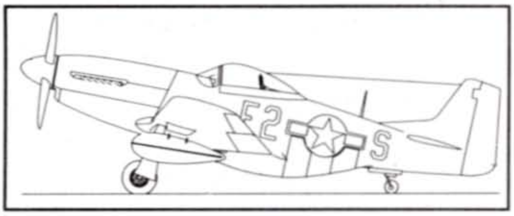
NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

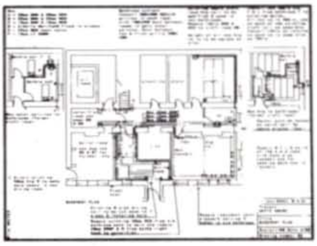


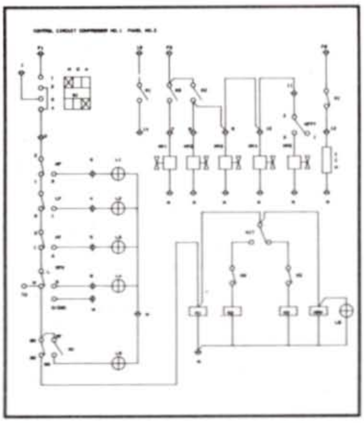


The major features of NOVACAD are:

- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique facility to output to any BBC compatible plotter.







MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours with shadow memory, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will have additional user memory for more complex drawings.
6502 second processor will also increase the drawing speed.

NOVACAD is available in two versions

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard, Tracker Ball or a Mouse.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

Witch Hunt

By STEPHEN GRAY

IT'S halloween and Olive, the wicked witch of the West End, is trying to make a potion to cure acne. Unfortunately she forgets to fry the newt's crest, and the acne medicine becomes a potion to transport people to the demon world.

Our unsuspecting heroine smears the potion on to her face and disappears broomstick and all in an unimpressive wisp of smoke.

"Oh dear!" she cries – or words to that effect – and realising what she has done she struggles to remember how to escape.

Wasn't there something about the 42 keys of Transportal? But then her concentration is broken by an inconsiderate demon who decides to fry her for her insolence. Not surprisingly, Olive runs away.

Witch Hunt is played in the demon world, which is 70 times as large as the screen. Guide Olive through the halls of the demons, collecting the keys as you go.

Watch out for demons lurking in the shadows, and whatever you do, don't touch the walls or anything but the keys.

To mortals like Olive handling demonware is more dangerous than driving a Sinclair C5.

The keys you will need are: Z left, X right, : up, /down, S sound on, Q sound off, Delete pause, and Copy continue.

The program makes use of software sprites. These are graphics which are directly uploaded into the screen memory from the user RAM. A machine code routine results in the sprites being printed very quickly.

Four sprites are used – witch facing right, witch facing left, demon and trap, stored in RAM at locations &5600-&567F, &5680-&56FF, &5700-&577F and &5780 to &57FF respectively.

After you have typed in and tested the program remove the REM from the start of line 70 to disable Escape. Happy hunting.

PROCEDURES

witch	Depending on the keys being pressed calls appropriate procedures. Also checks if witch has been caught by demon.
sprite	Calls routine to print appropriate sprite.
demon	Moves demon and checks if witch has been caught.
check	Assembles routines to check if witch has collided with anything.
left	Moves witch left and checks if witch has hit wall, trap or key.
right	As left, but moves right.
up	Up.
down	Down.
block	Positions and prints trap at random location.
endgame	Prints Game Over, informs players of score and asks if another game is required.
music	Defines envelopes and assembles routine for interrupt driven music played throughout game.
dead	Witch dies, one life lost.
pause	Waits until Copy is pressed.
success	All 42 keys collected – prints congratulations screen and tune. Asks if another go is required.
title	Prints introduction screen.

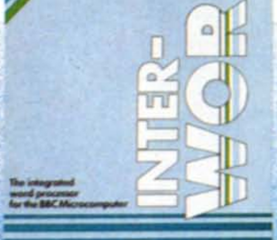
VARIABLES

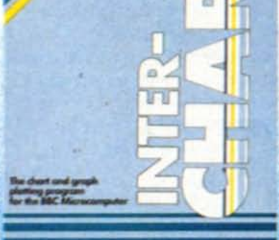
D%(70)	Screen data array.
K%(70)	*K%(room)*=1 if there is a key in the room.
L%	Current room.
K%	Keys collected.
LI%	Lives remaining.
dead%	If witch has just died =1.
DX%,DY%	Position of demon in 40ths of screen horizontally, 64ths of screen vertically.
D%	Is there a demon in current room?
E%	Stores last entrance used.
X%,Y%	Position of witch.
J%	Direction witch is facing.
MX%,MY%	Values of *X%* and *Y%* before witch moves.
MJ%	Value of *J%* before witch moves.
TX%,TY%	Position of trap.

Full listing starts on Page 132

The only truly integrated suite of ROMs

This unique system allows all ROM-LINK compatible ROMs to be fully integrated. Up to 16 'packages' can be held in memory at once, so for example you could have a spreadsheet and a chart and a document in the word processor all being worked on at the same time. The ROM-LINK system also allows any data to be transferred directly from any package to anyother. For example spreadsheet data could be imported into the word processor, and then back again into the spread-sheet, then into INTER-CHART to plot a graph.


ROM
INTER-WORD
The integrated word processor for the BBC Microcomputer
Computer Concepts


ROM
INTER-CHART
The chart and graph plotting program for the BBC Microcomputer
Computer Concepts

ROM
INTER-SHEET
The spreadsheet program for the BBC Microcomputer
Computer Concepts

ROM
INTER-BASE
The data management system for the BBC Microcomputer
Computer Concepts

* TO BE RELEASED SOON

FOR THE BBC MICRO

Computer Concepts

The Master Compact Compatible

INTER-WORD

The latest word processor from the same stable as WORDWISE and WORDWISE PLUS, the most successful programs ever written for the BBC Micro computer. With years of experience and feedback from users, the authors of INTER-WORD have ensured that it suits everyone's needs. A great deal of attention has been paid to ensuring that INTER-WORD is fast, efficient and above all simple to use. Being menu operated the newcomer does not need to remember strange key combinations or command names. The menus are not a burden to the experienced user since there are shortcuts to access many of the features.

REVIEWS

"the most significant program since WORDWISE." ... "INTER-WORD on the BBC Micro compares favourably with word processors costing five or ten times as much on the IBM PC and the like." ... "INTER-WORD is a real pleasure ... a truly worthy successor to WORDWISE"

Gordon Taylor A&B Computing

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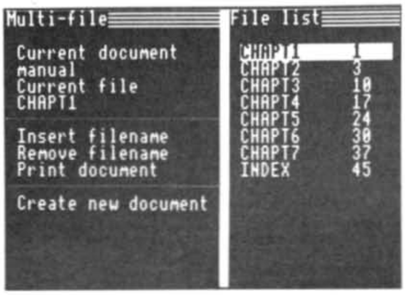

```
Multi-file                      File list
 Current document               CHAPT1      1
 manual                         CHAPT2      3
 Current file                   CHAPT3     10
 CHAPT1                         CHAPT4     17
                                CHAPT5     24
 Insert filename                CHAPT6     30
 Remove filename                CHAPT7     37
 Print document                 INDEX      45

 Create new document
```

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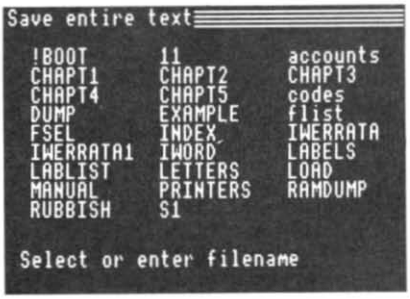

```
Save entire text
 !BOOT        11          accounts
 CHAPT1       CHAPT2      CHAPT3
 CHAPT4       CHAPT5      codes
 DUMP         EXAMPLE     flist
 FSEL         INDEX       IWERRATA
 IWERRATA1    IWORD       LABELS
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 RUBBISH      S1

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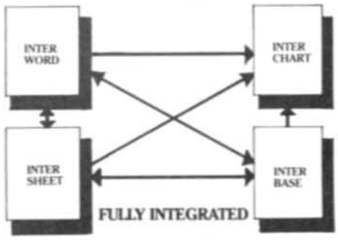

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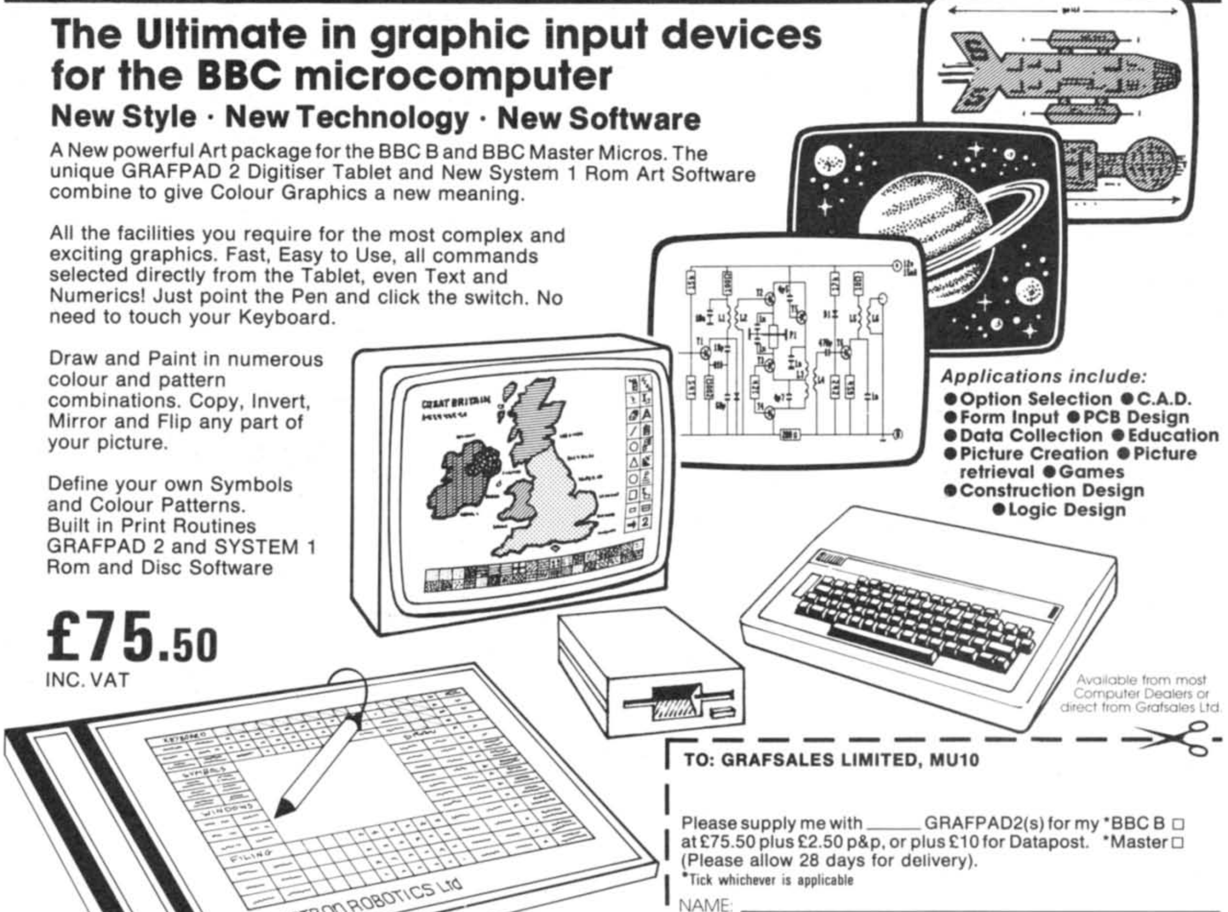

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Now it's the silicon chippy!

The great British chip shop is not only alive and well but can be very big business indeed. FRANK TERRELL is a director of the Essex-based Fish'n'Chick'n Group, a company with branches throughout the Home Counties. To him fell the responsibility of streamlining the operation based on the BBC Micro.

Here is Frank Terrell's story of his attempts to convert the business into The Silicon Chippy. And bearing in mind it is usually the lot of the secretary to monitor the micro, there is also a tailpiece from Mary Williams, Fish'n'Chick'n's Girl Friday, on her struggle to become computer literate.

I STARTED in the fish and chip business at 14 working for a gentleman who had just one shop, a wife, three sons, one daughter and very little else. Mum and Dad worked in their shop six days a week – it's illegal to sell fish and chips on a Sunday – and raised their family as best they could.

Mum and Dad now have a company called Fish 'n' Chick'n worth nearly two million pounds, the same number of children, a profusion of grandchildren and, of course, I'm still around too.

As Fish 'n' Chick'n expanded it became necessary to develop a system to standardise our paperwork and procedures for processing it. The portioning of fish is very difficult to control. If only God had made fish all the same shape and size life would be so much easier.

Potatoes, too, can cause considerable problems. We have to check the sugar content of each delivery – too much sugar will cause the chips to fry very dark – and even the water content will affect the chips' cooked weight.

In our business, as in many others, our biggest problems are concerned with stock control. We have a very simple method. We start with so much stock, we add to it any that is delivered, we deduct any that's left. The result is the amount of stock sold. At the end of the

→

'Long live micros'

By Mary Williams

INITIAL reaction – HELP! I'd never had any dealings with computers, not even to play Space Invaders, so I was, to say the least, apprehensive. When Frank told me he was writing a computer program which would do 50 per cent of my manual work I was intrigued. I understand absolutely nothing about programming, but its practical results appealed to me.

Over the 18 months it took Frank to write the program he would ask me to explain how I calculated various bits of my work and it seemed like no time at all before each bit of information was transformed into computer language.

At first it was hard to understand the theory of it all, but once it had been demonstrated, everything fell into place. We had Frank's own computer in the office for a trial period of a few weeks, and if all worked out the company would buy its own equipment.

It all seemed double dutch to start with, but once I learned what a disc drive was, it wasn't too bad. I had been warned about pressing the Break key. This terrified me, even when I had to use it to boot up a program.

So the first chart was ready to be processed. Although initially there is a little extra preparation regarding checking stock usage and tracing transfers of stock, the overall time saving is fantastic. Frank ran through the program with me again and showed me how to use all the functions. Auto, for example, is a great time saver when entering stock.

On average the computer saves me around six hours a week – time to do all the small but important jobs which never seemed to get done before. Accuracy is also a great advantage, in that calculations are not at risk from human error, and if wrong figures are entered it is easier to correct them using the edit facility. The old way of doing things would have meant a rewrite of the whole chart.

Although I still don't fully understand the technical side of it, I am now confident when I back up discs and have to save information to disc (done frequently when I use the incorporated word processor.)

There is no doubt in my mind that the computer has been the best investment the company has made in the office. It not only processes all our internal paperwork, we run a wages program which also saves a considerable amount of time, and the word processor is a great advantage too.

To return to the manual way of processing the internal stock figures and wages would come very hard indeed. Long live computers!

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week we collect from our shops the day-to-day stock sheets and summarise them.

It takes a long time to process stock sheets, even without the errors which occur, because it takes nearly three hours of preparation before you can open the doors of a fish and chip shop. Three hours of humping sacks of potatoes, peeling and chipping, cutting fish, often with hands numbed with cold, standing in fridges counting every single pie, sausage and saveloy – all this perhaps, after working until midnight the night before.

After a brief encounter with a ZX81 it occurred to me that it might be possible to write a small program to perform the repetitive calculations. My intention was to learn the art on a need to know basis.

That was two years ago. I found that I needed to know quite a lot. The more I learned, the more I came to realise just how powerful and versatile the computer was. The program grew and grew. Now the completed program does everything in the same way as the tried and tested manual system.

But our BBC machine does everything so very much quicker and calculations are error free.

Fish 'n' Chick 'n has been operating the system for about six months and it has saved quite a lot of time in the office. This is in no small part due to our secretary, who has adopted very quickly to the sudden change.

After a few weeks trial using my own BBC B, dual Mitsubishi drives, an Epson MX80/FT and the colour portable when I can get it, I managed to convince the Board that a computer would be a wise investment.

"Well, if it can do the wages . . .", was the ego-shattering factor which won the day. The wages package is from Gemini, by the way.

I was able to get hold of a Master 128. I thought it better to get a medium resolution colour monitor, a Philips in fact – one that doesn't receive the racing from Newmarket or the Test from Lords. This ensures that the minute saved does not result in an hour wasted. My program uses lots of colour in Mode 7 for identification purposes.

Overall I am very pleased with the results of installing the computer. Not just to see my program working, but the effect that it has made on Fish 'n' Chick'n as a whole. Our managers have all had the opportunity to operate it and now have a greater understanding of the paper side of the business.

The standard of the managers' paperwork has generally improved and we are now able to give each one a copy of his weekly stock sheet which he keeps for his own personal record.

In the case of Fish 'n' Chick 'n' and our silicon chippies, the 65SC12 is not so much a processor chip, it's more of a chip processor. Our own little fast food processor. ●

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There's more to mail merge than meets the eye...

LOUISE COLINSON explores the capabilities of Mini Office II

I HAVE found Mini Office II a most useful addition to my micro. However as I only use it at home, I felt that some of the more powerful features would be of little use to me, so I never tried them.

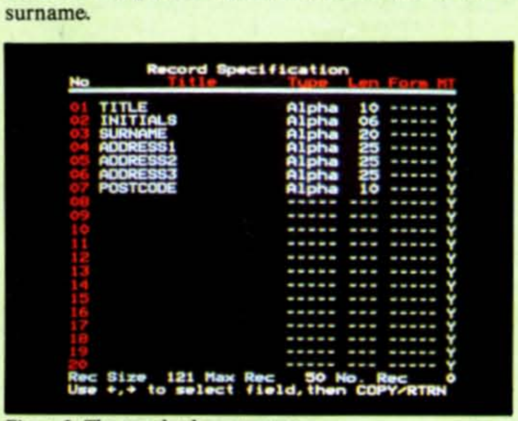
Of course I use both the word processor and communications modules frequently, and the database, spreadsheet and graphics present data in a form that impresses friends and colleagues. However the label printer program and the mail merge facility never seemed to be of any use to a home user like me. How wrong I was.

When I heard of proposals to change the structure of local schools I decided to write to several local councillors expressing my concern. At last I had a chance to put the Mini Office II mail merge facility and label printer to real use. But talk about hiding your light under a bushel. The manual just skims the surface of the topic, which is a pity because it couldn't be easier. For those of you tempted to try it here's how it's done.

The first task is to set up a database of the names you want to write to. I assume that you have read the Data Protection Act and are registered if necessary – mind you if you understand its complexities you'll find mail merging a doddle.

For those new to databases there are three terms you must understand before going any further:

- File: All the names and addresses that you are using.
- Record: One of those names and addresses.
- Field: One part of a name and address, such as the surname.



```
          Record Specification
No        Title            Type   Len Form  MT

01 TITLE                   Alpha  10  ----- Y
02 INITIALS                Alpha  06  ----- Y
03 SURNAME                 Alpha  20  ----- Y
04 ADDRESS1                Alpha  25  ----- Y
05 ADDRESS2                Alpha  25  ----- Y
06 ADDRESS3                Alpha  25  ----- Y
07 POSTCODE                Alpha  10  ----- Y
08                         -----  ---  ----- Y
09                         -----  ---  ----- Y
10                         -----  ---  ----- Y
11                         -----  ---  ----- Y
12                         -----  ---  ----- Y
13                         -----  ---  ----- Y
14                         -----  ---  ----- Y
15                         -----  ---  ----- Y
16                         -----  ---  ----- Y
17                         -----  ---  ----- Y
18                         -----  ---  ----- Y
19                         -----  ---  ----- Y
20                         -----  ---  ----- Y
Rec Size  121 Max Rec   50 No. Rec       0
Use ↑,↓ to select field,then COPY/RTRN
```

Figure I: The new database structure

After deciding on the format of your records you edit the structure of the database to make it similar to Figure I. Note that three fields are used for the full name – title, initials and surname. This is so that when you merge the database into the word processor you can use the full name – Mr J. Smith – or part of the name – Mr Smith – by using the appropriate fields.

Once you have edited the structure it is a good idea to save the database with no records entered, so that the structure can be used for other applications. You then enter the names, using edit records, and when you have entered them all save the database under, say, the filename "names". If you are entering a lot of names it would be wise to save every few entries.

You can easily print the names from the database – remember to change the Hardware Options from screen to the appropriate printer. However now I have discovered how easy and flexible it is to use the word processor I doubt if I'll use the database printout routines for anything except a quick viewing of what I have typed in.

To print database files from the word processor you use two embedded commands – GD and FL. Embedded commands are instructions to the micro to do something, but they do not appear when the actual text is printed out.

You enter them by pressing *f5* before each command, and finally *f6*. The commands should then show in magenta. You can use capitals or lower case for them.

GD stands for Get Database and is followed by the name of the database file that you wish to use. FL is an abbreviation of FieLd and is followed by its number. So to do a mail merge you use GD once at the start of the text, and FL several times throughout it. You then ask for several copies of the letter. As the first is printed the first record of the database specified by the GD command is used. FL1 will print the first field of the first record, FL2 the second field and so on.

When the letter has printed, provided you have asked for more than one copy a second will be printed. This time the FL commands will print the appropriate fields from the second record.

Let's start by printing a list of the names – just enter the edit mode of the word processor and type the following, ending with Return:

```
f5 GD"names" f5 FL1 f5 FL2 f5 FL3 f5
FL4 f5 FL6 f5 FL7 f6
```

Note that *f5* means press function key 5 and the text following will appear in magenta. Press Escape to return to the word processor menu. Make sure you're now using the tape or disc containing the file of names,

→

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then select Print Text.

At the first sub-menu – Print Options – just press Return to select Print Text. You will then be asked how many copies you require. Suppose you have 30 names in your list, answer 30 to this question.

Now that you have discovered how easy it is to print a list of names from the database file using the word processor, printing letters to all the people in your file is a very small step. Type in the letter as shown by the two screens of Figures II and III. Remember that the letters shown in purple are embedded commands, and to get these just press *f5* before the command and *f6* after it. Note that the ↑ symbol represents the Tab character.

We have already discussed the embedded commands GD and FL. To make producing a tidy letter very easy Figures II and III use several others. Here is what they do:

LL65 sets the line length to 65.

LM12 sets the left margin to 12. This means that the printout, with line length 65 and paper width 80, will be approximately central.

DT40 defines the tab as 40, so when tab is used in front of each line of the address it will be moved to the right. Notice that the tab is redefined to 5 further down the letter.

FJ sets full justification, so the letter will be evenly spaced between the left and right margins.

EP puts you into paged mode. The paging commands such as BP will now work.

BP forces a new page – provided you have issued an EP command first.

GD"names" prepares for reading fields from the database file "names".

FL1 prints field 1 of the present record.

CE centralises the message following it.

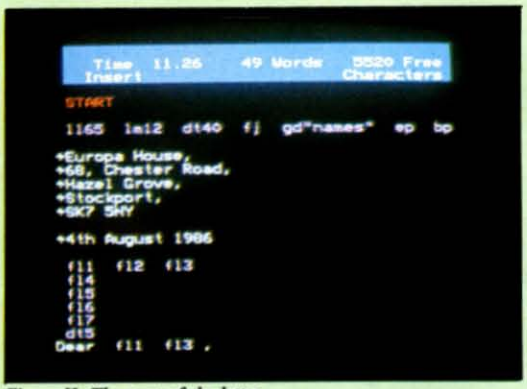
Once you have typed in your letter save it, and then print out several copies by following the same steps you used to print out the list of names.

Now your letters are printed you need envelopes addressing. The ideal way is to feed your database file into the Label Printer. Load the Label Printer program into your micro and load the database file using the Load File option. Select Edit Format from the Label Printer menu, and then set up number of labels across the page and any other variables that you want to change from the Edit Format menu. Once these are set select Edit Label.

In the Label Printer Edit mode fields are represented by # followed by a number. Edit your label to look like Figure IV, then press Escape twice to return to the Label Printer menu.

Select Print Labels and, from the menu, choose the Test Print option. This will show you the position of the printout and give you a chance to move the paper slightly if necessary. Keep doing test prints until you are satisfied with the printout's position.

You will notice that the number of labels will have been set automatically to the number of addresses in the file you loaded. If you want two labels for each address just double this number. You then select Print Labels and they will print.



```
   Time  11.26    49 Words   5520 Free
  Insert                     Characters
START

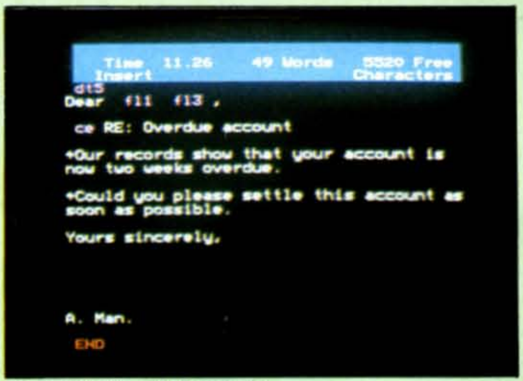
ll65  lm12  dt40  fj  gd"names"  ep  bp

↑Europa House,
↑68, Chester Road,
↑Hazel Grove,
↑Stockport,
↑SK7 5HY

↑4th August 1986

 fl1  fl2  fl3
 fl4
 fl5
 fl6
 fl7
 dt5
Dear  fl1  fl3 .
```

Figure II: The start of the letter



```
   Time  11.26    49 Words   5520 Free
  Insert                     Characters
 dt5
Dear  fl1  fl3 .

 ce RE: Overdue account

↑Our records show that your account is
now two weeks overdue.

↑Could you please settle this account as
soon as possible.

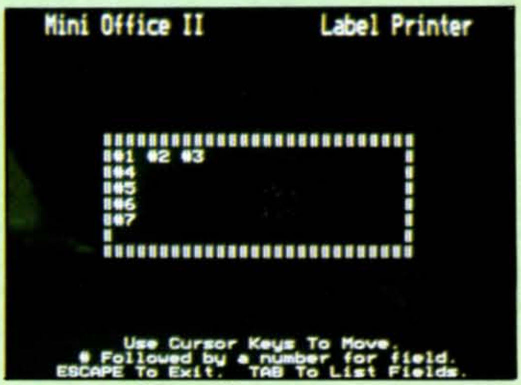
Yours sincerely,




A. Man.

 END
```

Figure III: The end of the letter



```
Mini Office II          Label Printer




        ##############################
        ##1 #2 #3                    #
        ##4                          #
        ##5                          #
        ##6                          #
        ##7                          #
        #                            #
        ##############################



        Use Cursor Keys To Move.
     # Followed by a number for field.
  ESCAPE To Exit.   TAB To List Fields.
```

Figure IV: Label Printer Edit screen

Don't let the fact that this feature of the word processor is called mail merge fool you into thinking that just because you have no letter to send you can't use it. It is a far more powerful printout option for the database than the in-built one, allowing neat work even on preprinted forms such as invoices.

Teachers can use it to produce personalised worksheets for their pupils, and hotels can use it to print out several different standard menus – the various print size options of Mini Office II are also useful for these applications.

Its possibilities seem endless. If you've come up with an original application – particularly if you have used the mail merge facility for uses other than letters or circulars – write and tell *The Micro User*. ■

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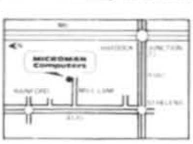

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Appearances DO count

NIGEL PETERS looks at the screen display in Part 6 of his series on spreadsheets

IN the past five articles we've covered the basic principles of spreadsheets in a fair amount of detail. We've learnt how to enter labels, data and formulae and seen some of the things that you can do with a spreadsheet.

While the examples have been fairly simple – they have to be to fit on the page – they have shown the elements of spreadsheet use.

One point that I have stressed is that it saves a lot of time, trouble and tears if you try planning your spreadsheet beforehand. Really it's a matter of commonsense. The trouble is that, like using GOTO in a Basic program, it's one of those things we advise other people to avoid while doing them ourselves.

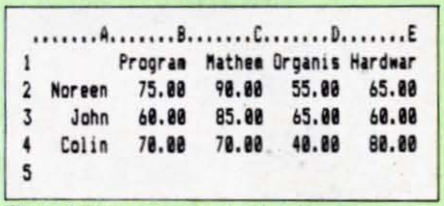
With that in mind, this month we'll be looking at ways of altering the screen display, including a method of doing this *after* we've created our spreadsheet. And while I'll be using Mini Office II for my examples, you'll find that the general principles apply to other spreadsheet programs. The data for this month's spreadsheet is held in Table I which shows the marks of the top three students in four exams.

	Programming	Mathematics	Organisations	Hardware
Noreen	75	90	55	65
John	60	85	65	60
Colin	70	70	40	80

Table I: Exam results

This month is very much a hands-on session. Try creating your own spreadsheet to hold this information using the techniques we've covered in the past few months.

Figure I shows the results of my efforts. Notice that this spreadsheet is just being used to hold data, I'm not using any formulae. If you feel so inclined, have a go at finding the highest and lowest marks and the averages attained. For the present article, however, we just need the data in Figure I.



```
 .......A.......B.......C.......D.......E
1               Program Mathem Organis Hardwar
2  Noreen  75.00   90.00   55.00   65.00
3    John  60.00   85.00   65.00   60.00
4   Colin  70.00   70.00   40.00   80.00
5
```

Figure I: The exam marks in the default spreadsheet

There's one point that stands out in the spreadsheet. The exam subjects in row 1 have been cut down. The columns are only 7 characters wide and you can't have the word Programming in 7 letters, you get Program for your pains.

This isn't all that satisfactory, is it? It would be nice to be able to get full length titles for the columns. And do we really need the two decimal place accuracy for the marks? Surely whole numbers would be better?

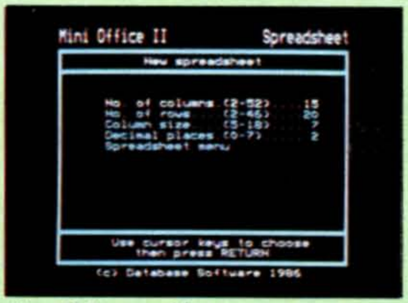
All this can be done. But, as people always say when I ask for directions: "I wouldn't start from here, love".

So let's leave our old spreadsheet and create a new one.

Previously we've always taken the main menu's Edit Spreadsheet option to go about it. Now this isn't really the proper way to do it. All Edit Spreadsheet does is to allow you to enter data, labels and formulae into an already existing spreadsheet.

So far we've assumed that you've just gone into the spreadsheet program and that there's nothing in memory. The result is a nice clear spreadsheet we can start work on. However, if you'd been working on a previous spreadsheet, you'll find that selecting Edit Spreadsheet doesn't get rid of the old data.

What you want is the New Spreadsheet option which you'll find halfway down the main menu. Select it and you'll see a prompt asking if you really want to create a new spreadsheet. Think carefully before you reply. Answering Y for Yes not only results in a clear grid, it wipes any previous spreadsheet from memory. This can be extremely depressing if you do it inadvertantly. (And you will, you will.)



```
Mini Office II                Spreadsheet
              New spreadsheet

     No. of columns (2-52) ....  15
     No. of rows    (2-46) ....  20
     Column size    (5-18) ....   7
     Decimal places (0-7) .....   2
     Spreadsheet menu

        Use cursor keys to choose
           then press RETURN
      (c) Database Software 1986
```

Figure II: New spreadsheet menu

When you eventually pluck up courage to take the New Spreadsheet option you'll find yourself confronted with the choices shown in Figure II. After each choice you'll find two numbers enclosed in brackets followed by another number.

The numbers in the brackets show the range of values allowed for that particular option. The other number shows the default value, the one that the computer uses until you tell it something different.

As you can see from the menu, the default spreadsheet has 15 columns, 20 rows, the figures are displayed to two decimal places and each column is 7 characters wide. This last figure explains why our

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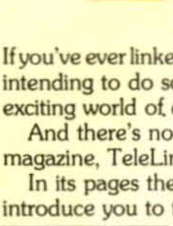

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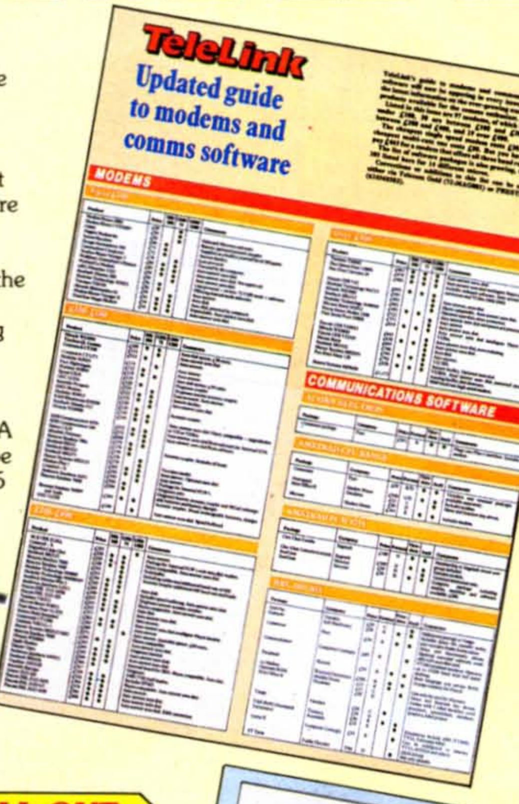

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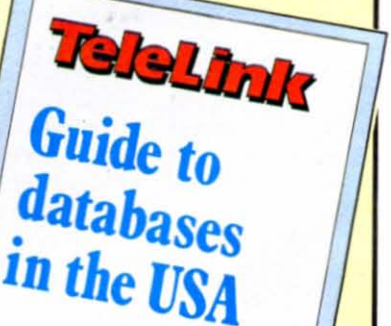

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PLEASE USE THE ORDER FORM ON PAGE 159

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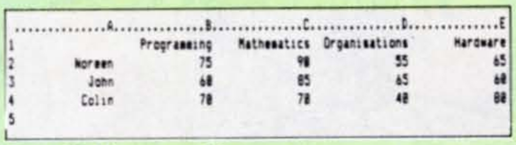
examination titles were cut off in their prime. Let's use the menu to create a spreadsheet that will solve this problem. And at the same time, let's get it to display marks in whole numbers.

We select the options in the usual way, using the cursor keys to move up and down the menu until the required choice is highlighted, then pressing Return. A message now appears at the bottom of the screen asking for the new value to be entered. After you press Return again, you go back to the menu.

Let's change the column width from 7 to 14. This takes care of our exam titles. While you're at it, reduce the number of rows to 12 and columns to 8. Finally change the decimal place figure to 0. Now only whole numbers will appear. A point to note is that while whole numbers will be displayed (the micro rounding as necessary) when it comes to calculations the decimal values are taken into account.

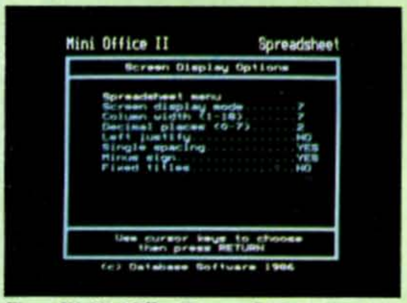
When you've used the menu to make all these changes, try entering the data from Table I into the newly created grid. You should end up with something like Figure III.



```
..............A..............B..............C..............D..............E
1                  Programming    Mathematics  Organisations      Hardware
2         Noreen            75             90             55            65
3           John            60             85             65            60
4          Colin            70             70             40            80
5
```

Figure III: The new spreadsheet

Now that we've got our new spreadsheet in memory let's try altering the way it's displayed. As I've said, if we were being sensible we'd have worked out the spreadsheet before we entered it. Human frailty being what it is, most spreadsheets allow you to make some changes, though what you can do varies from program to program. Mini Office II is quite flexible in this respect as you'll see if you pick the Alter Screen Display option from the spreadsheet's main menu. The result is yet another menu, shown in Figure IV.



```
Mini Office II                    Spreadsheet
        Screen Display Options

  Spreadsheet menu
  Screen display mode .......7
  Column width (1-18) .......7
  Decimal places (0-7) ......2
  Left justify .............NO
  Single spacing ..........YES
  Minus sign ..............YES
  Fixed titles .............NO

        Use cursor keys to choose
           then press RETURN
     (c) Database Software 1986
```

Figure IV: Mini Office II screen display options

The first option allows you to change the mode the spreadsheet is displayed in. Pressing Return "toggles" through the available modes. You stop when you've got the one you want. As it is we'll stay in Mode 7. Let's work through the other options and see what they do.

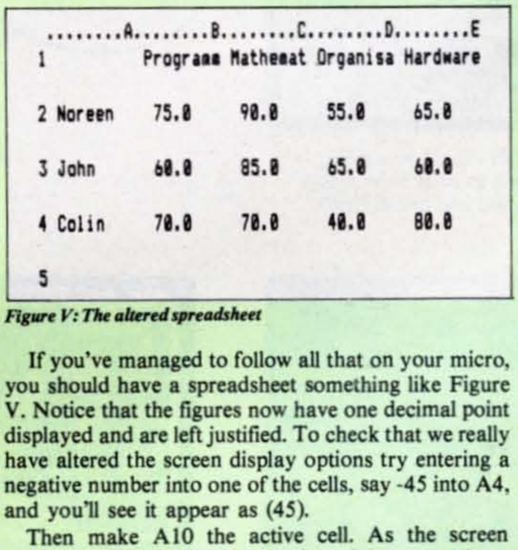
The column width and decimal places options look familiar. Try changing them to 8 and 1 respectively. Can you guess what effect this will have on our newly-born spreadsheet?

The next option down decides whether there is left justification. The default is NO, and pressing Return toggles this between YES and NO. If you select left justification then everything in a cell starts at its lefthand side. Otherwise the cell contents are aligned to the right of the cells. For the moment pick left justification.

The single spacing option decides whether or not there will be a blank line between the rows. The default is YES and this can be toggled to NO, when the blank lines (known as double spacing) appear. Pick NO for the moment.

The minus sign option may appear a bit confusing until you realise that in financial circles a negative number is surrounded by brackets rather than having a minus sign in front of it. So -73 will appear as (73). While none of our students have actually done that badly, toggle the choice to NO.

The final option decides whether or not the headings in column A and row 1 stay in view as you wander through the spreadsheet. This option comes into its own when the spreadsheet is so big that not all of it can appear on the micro's screen at one time. Pick YES and the titles will be fixed.



```
........A........B........C........D........E
1       Programm Mathemat Organisa Hardware

2 Noreen    75.0     90.0     55.0     65.0

3 John      60.0     85.0     65.0     60.0

4 Colin     70.0     70.0     40.0     80.0

5
```

Figure V: The altered spreadsheet

If you've managed to follow all that on your micro, you should have a spreadsheet something like Figure V. Notice that the figures now have one decimal point displayed and are left justified. To check that we really have altered the screen display options try entering a negative number into one of the cells, say -45 into A4, and you'll see it appear as (45).

Then make A10 the active cell. As the screen adjusts itself to display this section of the spreadsheet, you'll see that the although Noreen and the others disappear, the column headings stay in place. This would be useful if there were more students.

And if all that hasn't proved to you that you can alter a spreadsheet's layout once it's in memory, try going back to the Screen Display Options menu and pick a column width of 3. The asterisks appear because our long-suffering spreadsheet hasn't room for the figures. (Remember decimal places and minus signs take up a character space).

However the detail hasn't been lost, you can recapture it by going back to the menus and opting for a wider column width when all will be revealed.

● *And more will be revealed next time as we look at more ways of manipulating our spreadsheets.*

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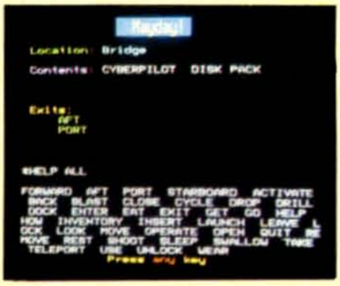

```
Mayday!
Location: Bridge
Contents: CYBERPILOT  DISK PACK

Exits:
    AFT
    PORT

*HELP ALL

FORWARD  AFT  PORT  STARBOARD  ACTIVATE
 BACK  BLAST  CLOSE  CYCLE  DROP  DRILL
 DOCK  ENTER  EAT  EXIT  GET  GO  HELP
HOW  INVENTORY  INSERT  LAUNCH  LEAVE  L
OCK  LOOK  MOVE  OPERATE  OPEN  QUIT  RE
MOVE  REST  SHOOT  SLEEP  SWALLOW  TAKE
 TELEPORT  USE  UNLOCK  WEAR
             Press any key
```

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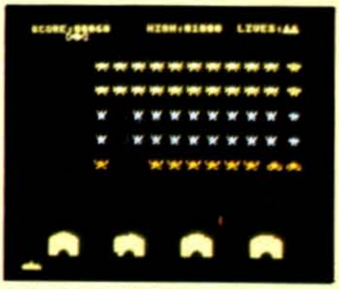

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TO ORDER TURN TO THE FORM ON PAGE 159

The star treatment for Basic utilities

HUGH HASKELL shows how to make Basic programs act like their machine code cousins

SINCE I've had my BBC Micro I've collected a number of utilities, home brew or other. I have them on Drive 2 for instant use during program development. So, for example, **ROMS* calls up *The Micro User* ROM handling program – November 1985 – from my library.

This works perfectly when the routine is in machine code, but I had several utilities in Basic, so I considered making a Basic program behave the same way. Now all my utilities can be loaded by a star command.

I found the most simple way was to write in machine code the equivalent of:

```
OLD Return  RUN Return
```

To create this effect from a program – Basic or Assembler – we can use the **FX138* function. All we need is **FX138,0,Y*, where Y contains successively the characters of the above instructions – including Return. In assembler this is:

```
 10 Osbyte=&FFF4
 20 P%=&2000
 30 [
 40 LDA #138       \ Put 138 in A
 50 LDX #0         \ Put 0 in X
 60 LDY #ASC"O"
 70 JSR Osbyte     \ Abbreviation
 80 LDY #ASC"."    \ for OLD
 90 JSR Osbyte
100 LDY #13        \ Return
110 JSR Osbyte
120 LDY #ASC"R"
130 JSR Osbyte     \ There is no
140 LDY #ASC"U"    \ abbreviation
150 JSR Osbyte     \ for
160 LDY #ASC"N"    \ RUN
170 JSR Osbyte
180 LDY #13        \ Return
190 JMP Osbyte
200 ]
```

You should note that the final osbyte call is by a JMP, relying on the RTS in the OS routine for return.

In the following I will assume that you have PAGE at &1900. If it is not simply adjust the values accordingly. For example if PAGE is &E00 then for 18D9 put DD9 and for 1910 put E10 and so on.

Type in the listing, run it and save the resulting object code by:

```
*SA. AR 2000 2028
```

This routine tackles the problem in a simplistic but universally applicable way.

Another method would be to make a call direct to the Basic ROM, but this could only be compatible with one version of Basic at a time.

There are three ways to use the routine – include it in the Basic program, put it before the start of the program, or put it after the end.

The first method entails incorporating the routine in a line of Basic not executed during the program's operation. This tends to get corrupted during editing or by a compacting routine, so take care. Make the first line of your program:

```
0 GOTO 10:##########...(using say 50 #
characters)
```

Then insert the routine into line 0 using:

```
*LO. AR 1910
```

When you list your program you'll get a lot of junk after the : in line 0. This is Basic's effort at detokenising the machine code, but it doesn't matter since in running the Basic, it won't be seen. Save the program using:

```
*SA. name 1900 <TOP> 1910
```

You should note the execution address has been given as an extra parameter.

If you type ***name** the program will load and the machine code at &1910 will start to run. This just inputs OLD:RUN to the keyboard buffer and starts the Basic running.

Try putting REM instead of GOTO 10 in line 0 and see if you can explain why it won't work.

A line like this may be put anywhere in the program as long as it is not seen by Basic. However, putting it elsewhere may pose problems in obtaining the necessary addresses.

To use the program in the second way just type:

```
*LO. AR 18D9
```

This can be typed after or before you load your Basic program. You then save your program using:

```
*SA. name 18D9 <TOP>
```

Now ***name** will load and run it. If you only want to load it then you

From Page 97

use ***LO.**<name>

If you want to use the third method, just type:

```
*LO. AR <TOP>
```

and save your program by:

```
*SA. name 1900 <TOP+&27> <TOP>
```

The machine code routine will then be above the Basic program. It is up to you to choose the way that suits you so some pros and cons of each method are shown in Table I.

Routine in a Program Line	*Routine below Basic*	*Routine above Basic*
FOR: The program is self-contained. It can be loaded by LO."Name" and can be chained.	**FOR:** Fits into memory below PAGE, not increasing program space. Adds nothing to the program itself, facilitating editing. Since AR is untouched by most operations, it is easily appended to several programs; simply LOAD them one after the other then *SAVE them. Only TOP needs to be determined.	**FOR:** Fits into memory above TOP, not increasing the program space. Doesn't increase length of Basic. The program can be loaded or chained.
AGAINST: It contains a funny line which can cause difficulties with editing and so on, and it increases actual program space occupied.	**AGAINST:** To load program only, needs *LOAD. If you SAVE (forgetting to *SAVE), AR is not saved with the program. Cannot be chained.	**AGAINST:** The inconvenience of being always at a different address. Needs mental arithmetic to work out end address. Will be lost if the program is run or modified.

Table I: Pros and cons of the different methods

If YOU ever key CHAIN, LOAD, *RUN, *ACCESS, *LOAD, *COPY, *DELETE, *COMPACT, *INFO, *TYPE, *DUMP or *EXEC, then YOU need . . .

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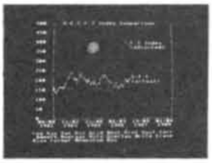

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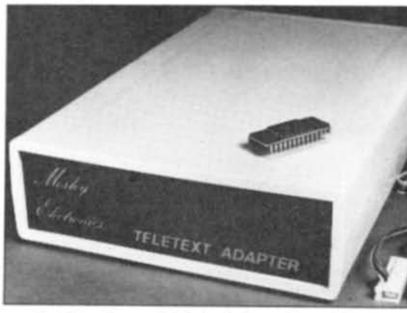

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'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.
The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.
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APPLICATIONS

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Filing charge: 20p per unit of 2,048 characters per month.

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Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

MicroLink PSS service: 2.5p per minute or part (300 baud); 3p per minute or part (1200/75 baud).

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MU 10-86

Who knows the secret of the old school tie?

..the Mad Hatter does

LET'S start with a look at one area of Hampstead that seems to cause lots of trouble for those of us who are not really interested in this social climbing nonsense – the snobbery domain, especially where public schools are concerned.

I wanna tell you a story. It provides some clues to the latter part of Hampstead wrapped up in a little, but not too much flannel.

A long time ago there was this chap William – kindly note the upper-class name – who was a good man and a bishop.

One fine day William decided to found a School for the Mannerly, and then he wondered what to do with the lads after they had left. So he founded a new college which, as it happens was at the University of Orcsford where Alice went.

A year or two later another good chap called Henry – again note the upper-class name – who this time happened to be a king, which is just a tiny bit posher than a bishop, decided to found a School for the Very Hungry.

Then he too thought of founding another college – only his was a King's College of course. He built it in a boggy place near Ely, or thereabouts, where some dissident scholars from Orcsford had set up a rival establishment which later on lured Pete Austin into its clutches.

After a while some chaps began to wonder how to identify the right sort of people to know. And so they started to wear little bits of rag tied round their necks called old school ties.

Those chaps who had been to the school founded by William (Manners Makyth Man) of Wykeham needed to know that they were at an older establishment than those yobboes at Eating, even if Wykehamists did have to go on to a New College afterwards.

You need to remember though that New College is older than King's College. The name was simply planned that way to puzzle American tourists (far sighted chap that William).

So in Hampstead an Old Wykehamist tie becomes a valuable passport to a job, making your fortune, obtaining the hand of Pippa and buying a house in Bishop's Avenue.

It's obviously worth getting hold of one at all costs and then wearing it, even if there are risks attendant upon impersonating an Old Wykehamist.

You must avoid frivolities like the cinema at all costs. Instead you should improve your appearance and join a suitable club – from the look of the inmates it must be the Travellers.

You must do a little shopping – and find something that can aid you in some judicious breaking and entering.

Do accept the offer of a job in the City, even if it's not as a commodity broker, and accept any other invitation you get.

Don't forget you aren't a yuppie. You have to act as though you have already arrived, even if arriving at a Covent

→

From Page 109

Garden rendezvous takes a little working out.

Above all don't be too honest – loyalty is not the name of this particular game. Cheat, steal and crawl your way to that mansion address. Once there do be nice to Chubby and don't smash his door down with your company car.

For those who are still stuck in the middle of this adventure and can't seem to progress to the dubious delights I've just mentioned here's some advice:

Don't forget that a nice SIT down in the middle of Hampstead Heath might be a good idea before catching the train anywhere – it should suit you in the end. In my quick run around I found just under 70 locations for Hampstead, and I don't think I missed anything.

While we're on the subject, Nick Outtershaw has found a useful bug in Hampstead – every time you re-examine the Bank's motto your score increases by 3 per cent. That makes it possible to complete the adventure with umpteen hundred per cent he says.

Having shown you how to get to the top I want to deal now with an example of a classic problem – the random destination puzzle, as typified by the location Bedquilt in Level 9's Colossal Adventure.

Like so many problems it needs a methodical approach. I don't know of any short cuts at all to this one, and it took me a whole evening of careful work to get the feel of it.

However the time spent was well worth it because now if I'm playing Colossal Adventure I approach the Bedquilt area with complete confidence, and if I come across a similar style of puzzle in another adventure I know what to do.

Incidentally I would like to point out that although you have solved a particular adventure it needn't mean that you don't ever play it again.

Give it a rest by all means, but it can be great fun to go back and see how far you can get without using a map, for instance.

Where Bedquilt is concerned you get some warning, and some clues as well. If you've entered from the Cheese Room by going NW then you've had a hint as to what the Bedquilt environment can be like because the Cheese Room warns that there might be other exits than those mentioned.

Anyway the description starts: "You are in Bedquilt, a long east-west passage with holes all around. There are so many holes that you can't tell which is which and so exploration can only be at random".

The clue is in the description "east-west passage" which suggested to me that those directions at least might prove to be consistent.

Since I had entered Bedquilt by moving NE the nearest I could get to a reversal of this move without risking the random elements was to type in W – and back to the Cheese Room I went.

I double-checked this by repeating the moves NE and W alternately until I was convinced that I hadn't accidentally triggered a repeat in the random move generator at this point. I then moved East and arrived at the Complex Junction with passages from the N, E and W, the hole in the ceiling and the salty smell from the North.

Resisting the temptation to explore I went West and then East again a few more times to make sure that I had a consistent move in this direction as well. Only then did I start the serious business of checking the random moves from Bedquilt.

The technique is simple, but tedious – which is why I devoted a whole evening to it. First I went North, described the location I arrived at, gave it a reference number and then concentrated on getting back to Bedquilt as quickly as possible.

I took little notice of any further locations encountered on the way back unless they were ones that I had already visited and mapped. In that case I then knew how to get back to the Cheese Room, and thus into Bedquilt again.

I did this 10 times for North, by which time I was beginning to get a preliminary feel of the different locations it as possible to visit.

I was therefore also learning how to get back to Bedquilt again, and so I began to make notes on the intervening locations.

Every new one that turned up duly got a number and a brief description according to the mapping method described in the August issue of *The Micro User*.

After going North from Bedquilt 10 times it was the turn of North-west 10 times and so on for every direction possible – you can see what I mean about the technique being tedious.

Actually it isn't quite so bad as it sounds. The pace speeds up very rapidly as the procedure goes on and the locations found become increasingly familiar. However it is essential to take this approach in order to overcome the random factor.

You need to be absolutely sure that you've covered all possiblities with a margin to spare, otherwise when you visit Bedquilt or a similar location at some future point, your map of the game will be thrown into confusion.

There are – unless anybody knows differently – eight possible locations you can visit from Bedquilt. The Cheese Room and the Complex Junction are reached by going West and East

PROBLEMS SOLVED . . .

Ian Culpin of Canterbury has solved Doctor Who and the Mines of Terror. He describes the game as excellent, and here are his solutions:

- *The electric spanner is used to remove the hatches.*
- *The pass card can be found in the Security Blocks.*
- *The memory capsule can also be found there.*
- *The cloth, when dropped beneath a controller, stops it in its tracks.*
- *The oxygen mask must be worn to go on the surface, where a generator can be found to give express facilites to the lift.*
- *Take the circuit boards O and P from the lift shaft to the construction area – here take the boards S and T to produce the word STOP.*
- *To get to the TIRU you must have the pass card and the cloth. At the TIRU there is a crystal lattice.*
- *To finish the game you have to take the lattice and the memory capsule to the unmapped area above the planet's surface. There you will find the tardis and the Master.*

respectively.

There is also the Two Pit Room, the Large Low Circular Room, the Large Room – knee deep in dust, the Shell Room, the Large Low Room and the Secret North South Canyon above a sizeable passage.

Finally you should note that the random factor will also deposit you in the Cheese Room and the Complex Junction.

I am now over 100 locations into The Price of Magik by Level 9 and I shall be able to give a considered review before too long. Preliminary comment is simply that, like all Level 9 adventures, you won't go too far wrong in buying it.

It looks like a game for which Santa ought to have the distribution rights – and that advice goes even for disc drive owners who have almost forgotten how to load from a tape. ■

ADVENTURE QUERIES

Marcel Langezraal of Leiden has sent me the solution to Superior Software's Citadel. Since a detailed solution appeared in the June Micromail I'm not including it here, but thanks to Marcel I can now offer advice on this game.

He tells me that he agrees with Bob Redrup's comments in the December 1985 issue about the high quality of Red Moon – and he too never found the fan. Marcel also has a Hobbit puzzle – he has completed the adventure, but wonders what the gold key is for. So do I. Can anyone help please?

Marcel is a cunning old adventurer who has been consigned to Purgatory in Adventure Quest. I was too once, though I have forgotten how it happened. Ah well that's life – or limbo.

All I know is that Adventure Quest is a game that everyone should have and the same goes for anything that Level 9 produces. They are so far in front of most software houses that in my opinion only two others are consistently in the same league – Magus and Robico.

Finally Marcel asks where the treasures are stored in Wheel of Fortune, behind the troll or in the building? If near the troll how do you stop him returning to his cave? If it's the building how do you transport all the treasure there?

Can anyone help?

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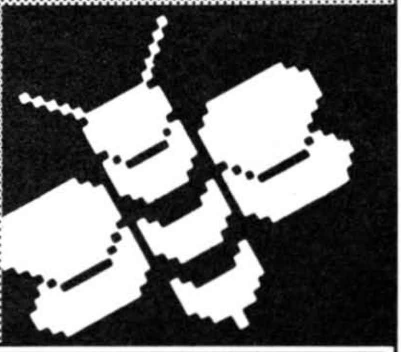

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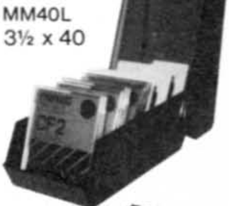

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Jumping to conclusions

6502 MACHINE CODE

Part 9

By MIKE BIBBY

DO you recognise Program I? It's last month's Program III and it prints out 256 asterisks. To tell you the truth, it's not the best way of doing the job, assuming you're weird enough to want 256 asterisks printing out....

The whole point of it was to show how relative addressing worked. Talking in terms of the hexadecimal code the assembler generates, the code for BEQ is followed by an offset byte. This byte is added to the Program Counter to give the address you've to branch to if the condition of the test is met.

It illustrates the idea fairly well but, as you've probably noticed, I've got my jumps and branches in a twist: Line 110 branches over the JMP of line 120 to *return* on line 130. The JMP itself branches back to the *print* of line 90. This is a bit like the Basic lines:

```
110 IF X%=0 GOTO 130
120 GOTO 90
130 RETURN
```

If you think about it, you could simplify this by tinkering with the condition of line 110, so that the code reads:

```
110 IF X%<>0 GOTO 90
120 RETURN
```

What we've done is to eliminate one jump by reversing the condition of the test.The result is shorter and more easily followed code.

We can do the same thing in machine code, as Program II shows. The opposite condition to the Branch if EQual to zero of BEQ is BNE, Branch if Not Equal to zero. That is, the branch will be taken when the last operation has resulted in zero (signified by setting the Zero flag).

Initially the machine code generated by Program II loads the X register with 0 and the accumulator with the code for an asterisk. Next it prints out what's in the accumulator with a call to oswrch and increases the contents of X by one – to one.

Then comes the test for the branch to *print*. Of course the result of INX was not equal to zero, so the Zero flag remains down – that is, it's clear or unset, so the branch is taken.

This causes another asterisk to be printed, X is increased to two, which again is non-zero so we branch back to print another asterisk, and so on. This continues until X holds &FF. After we've printed the asterisk this time, increasing X takes us round the clock to zero.

If you'll excuse the double negative, the result is not not equal to zero any more, so the branch isn't taken and we drop out of our loop to the terminal RTS. Can you see why we get 256 asterisks not 255 (&FF)?

Working that out shouldn't cause you any headaches, but have you seen the opcodes generated? Figure I shows how it's assembled.

```
0900                    OPT pass%
0900 A2 00              LDX # 0
0902 A9 2A              LDA # ASC("*")
0904 20 EE FF .print JSR oswrch
0907 E8                 INX
0908 D0 FA              BNE print
090A 60                 RTS
```

Figure I: Assembler output of Program II

Look closely at the code for BNE print. &D0 is the opcode for BNE, fair enough, but think about the following offset, &FA. This is supposed to be added to the address of the instruction after the branch. So when its condition is met, the branch should take us to

►

```
 10 REM PROGRAM I
 20 oswrch=&FFEE
 30 FOR pass%=0 TO 3 STEP 3
 40 P%=&900
 50 [
 60 OPT pass%
 70 LDX # 0
 80 LDA # ASC("*")
 90 .print JSR oswrch
100 INX
110 BEQ return
120 JMP print
130 .return RTS
140 ]
150 NEXT pass%
```

Program I

```
 10 REM PROGRAM II
 20 oswrch=&FFEE
 30 FOR pass%=0 TO 3 STEP 3
 40 P%=&900
 50 [
 60 OPT pass%
 70 LDX # 0
 80 LDA # ASC("*")
 90 .print JSR oswrch
100 INX
110 BNE print
120 RTS
130 ]
140 NEXT pass%
```

Program II

PROBLEM

I HAVE rigged my computer so that the sound can be switched between the internal speaker and a stereo. All games work OK when either speaker is connected and going, but I have found that if the sound is output to the stereo without the stereo turned on some of my games crash. Can you explain why this happens? – Chris Putt.

SOLVED

This is a bit of a puzzle as there is no reason why it should happen. However as it does you could try fitting a high impedance isolating transformer between the computer and the Hi-Fi. Maplins sell a suitable one: LT44 order code HX82D.

PROBLEM

EVERY time my BBC B is switched on the display is too high on the screen, which means that if one forgets to type *TV255, Mode 7 when any program is run the top disappears off the screen. – G. Talbot, Yeovil.

SOLVED

You need to have your TV adjusted so as to centre the picture. Alternatively you could have a sideways ROM that would issue a command as part of the start up routine but it is a bit of a waste of 8k of program space. Failing that, the only solution is to get a BBC Master which allows you to define a fixed switch-on offset on the display.

From Page 115

&090A+&00FA=&A04, in other words, quite a bit further up the code.

When you think about it though, we don't want to branch forward to &A04, we want to branch back up the code, to &904 in fact. Since the program works when you run it, this means that the 6502 somehow interprets &FA as meaning a backwards branch.

To cope with both backwards and forwards branches within the constraint of having only one byte for the offset, we divide our byte up, &00 to &7F being for forward and &80 to &FF for backward branches.

Although not strictly true, you can think of what happens like this. For offsets of &80 to &FF the offset is added to the Program Counter and the result reduced by one page (256 bytes). This takes us "behind" the original contents of the Program Counter and so effects a backward branch.

If you like, this is as far as you need to go on understanding relative branches – so long as you're using labels in the assembler the calculations are done automatically for you. However because of the one byte restriction on the offset, you can only branch forward by an offset of &7F (127) and backwards by an offset of &80 (128). If you try to branch beyond these limits you get an *Out of range* error.

offset	hex code	hex code	offset
0	&0	-1	&FF
+ 1	&1	-2	&FE
.	.	.	.
.	.	.	.
+127	&7F	-128	&80

Figure II: Two's complement notation

For those of you who like to know what's going on, relative branching uses what's known as two's complement notation to code the offset. Note the word *code*. It's simply a new way of interpreting the meaning of a byte so that we can include negative numbers as well a positive ones.

Remember what happens when we decrease the contents of a byte past zero – it goes round the clock to &FF. Now decreasing a byte by one is very much the same as taking one away from it, so we can consider &FF to represent −1.

Carrying on in the same vein, we can use &FE to represent −2 and so on. Of course we've got to stop somewhere – if we kept on assigning negative numbers like this we'd go round the clock yet again.

So when we get to &80, for −128, we stop. This leaves &0–&7F for ordinary positive numbers. This division isn't as arbitrary as you might think. If you consider the binary patterns you'll notice that the high bit of negative numbers is always set, whereas for positive numbers it's clear.

Figure II summarises the results of interpreting the meaning of a byte in this way.

So how does this apply to backward branching? Well, by adding a negative number to our Program Counter we get it to point to an address earlier in memory – that is, we branch backwards. Easy, isn't it?

After that diversion let's return to programming and take a look at Program III. Again this prints out 256 asterisks, but this time we decrease the X register with DEX. That is, we're using X to count down to zero, and this is by far the best way to control a loop you want to occur a specific number of times.

```
 10 REM PROGRAM III
 20 oswrch=&FFEE
 30 FOR pass%=0 TO 3 STEP 3
 40 P%=&900
 50 [
 60 OPT pass%
 70 LDX # 0
 80 LDA # ASC("*")
 90 .print JSR oswrch
100 DEX
110 BNE print
120 RTS
130 ]
140 NEXT pass%
```

Program III

Consider adapting Programs II and III so that they print out exactly six asterisks. In the case of Program III, you'd simply load X (immediate) with 6 and count down from 6 to 1, printing an asterisk each time. When we decrease X from one to zero we drop out of the loop, having printed six asterisks in all.

Program II, of course, trips the Zero flag by counting up to it so we'd have to start with X at 250 (&FA) – or is it 251?. I leave you to work it out. In the process you'll see why the technique of

Program III is far easier to handle!

Program IV puts Program III in a Basic surround allowing you to input the number of asterisks you want into *number%*. The line:

```
100 LDX # number%
```

incorporates this into the code. It shouldn't be too hard to follow, but note the "filter" of line 50. Take it out and try entering zero for the number of asterisks. You'll get some odd results. This is because our condition is at the end of the loop, after we've printed out an asterisk.

In this respect it's very like a Basic REPEAT...UNTIL loop, and it will always be done at least once.

Program V shows a way round this. We test at the beginning of the loop and skip it if X is zero. This type of loop, with the tests at the beginning, is known as a WHILE . . . DO loop.

● *That's all for this month. If you want some practice, try rewriting the programs using the Y register instead of X. Next month we'll be meeting a new flag – the Carry flag.*

```
  10 REM PROGRAM IV
  20 oswrch=&FFEE
  30 REPEAT
  40 INPUT "How many", number%
  50 UNTIL number%>0 AND number%<256
  60 FOR pass%=0 TO 3 STEP 3
  70 P%=&900
  80 [
  90 OPT pass%
 100 LDX # number%
 110 LDA # ASC("*")
 120 .print JSR oswrch
 130 DEX
 140 BNE print
 150 RTS
 160 ]
 170 NEXT pass%
 180 CALL &900
```

Program IV

```
  10 REM PROGRAM V
  20 oswrch=&FFEE
  30 REPEAT
  40 INPUT "How many", number%
  50 UNTIL number%>=0 AND number% <
256
  60 FOR pass%=0 TO 3 STEP 3
  70 P%=&900
  80 [
  90 OPT pass%
 100 LDX # number%
 110 BEQ return
 120 LDA # ASC("*")
 130 .print JSR oswrch
 140 DEX
 150 BNE print
 160 .return RTS
 170 ]
 180 NEXT pass%
 190 CALL &900
```

Program V

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THE NORTH WIND DOTH BLOW

. . . and we can keep tabs on it using MIKE COOK's micro meteorological station

"LOOK, how many times do I have to tell you?", shouted the editor, sounding like a cracked record of Larry Grayson. "Shut that door. I don't know where the wind is coming from, but I know where it's going!".

"What a great idea", I replied, "I'll make you something to tell you". And I was out of the office in a flash, just in time to hear a computer thud against the now closed door and the sound of weeping as it shattered.

We are gradually accumulating all the components of a micro weather station, so following on from the pressure gauge in the April 1986 issue of *The Micro User* and the anemometer in the August 1985 issue I would like to show you here how to tackle a wind direction indicator.

Most churches are adorned with weather vanes, simple mechanical devices that point into the wind and indicate its direction. One simple mistake often made is to say that the wind direction is where the wind is blowing to. In fact the direction is where the wind is blowing from.

The theory of the weather vane is quite simple, as can be seen in Figure I. The action of the wind pushes the vane around until it offers the least resistance. For a perfectly balanced system there could be two positions of minimum air drag, so you would never know if it were pointing into the wind or down wind.

The answer is quite simple – make the end that points down wind have a larger area than the up wind end. Hence the traditional design of a fish or a cockerel with a large tail. Many unusual designs have been made such as Father Time at Lord's cricket ground but they all have this same property.

So if we make a weather vane to point in the direction of the wind we are faced with the problem of sensing where it is pointing. To allow our instrument to be sensitive to the slightest breezes we need some method of measuring that does not require much force.

The classic way of doing this is with an optical shaft encoder, which is commercially available but unfortunately costs about a hundred pounds. The accuracy of this device is usually much greater than we require, so let's see how to fabricate one cheaply.

The theory of an optical shaft encoder is quite simple. Suppose you attach a transparent disc on to the shaft, and paint half of the disc black. Then if you shine a light through and pick it up with a detector on the other side you can tell the position of the shaft from the signal produced by the detector.

True this simple set up will only tell you which half of the circle the shaft is in, but it is a start. What you do is have several detectors, each looking through a track divided into dark and transparent sections.

If you have *N* detectors and tracks you will be able to determine the position of the shaft into 2^N sectors. For the purposes of a weather vane 16 positions would give the points of the compass and we can achieve this with

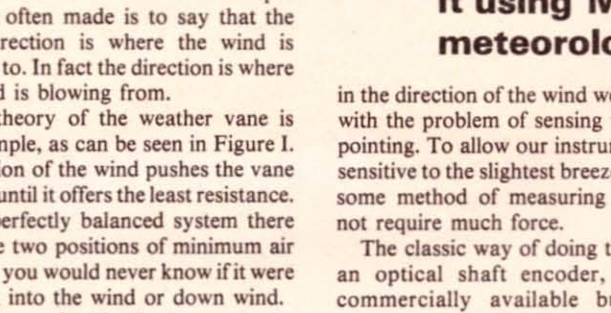


Figure I: The principle of a weather vane

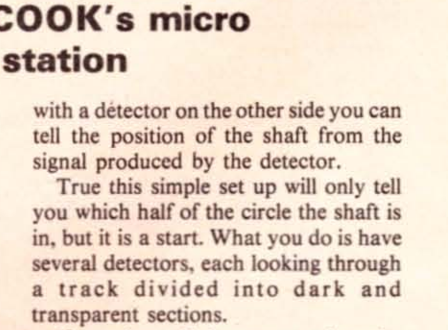


Figure II: A Binary disc

just four detectors.

Well how can we arrange the tracks of black and transparent on the disc? One simple answer is to use a binary disc as shown in Figure II. The inner track, being the shortest, is divided into two sections – one opaque and the other transparent.

As we go towards the edge and the tracks get longer we divide them into more sections with each track having double the number of sections of the previous one. When we read the number produced by the detectors we will have a binary number increasing by one for each sector the shaft turns.

Unfortunately this system is prone to error. To see why, consider what happens when the shaft moves from sector seven to sector eight. In the move three detectors are uncovered and one is covered, and it is impossible to make all the changes simultaneously.

This is due to the mechanical tolerances of marking the tracks and the electrical tolerances of the light level to make detectors switch. So the effect will be that each detector will change state at a slightly different place in the rotation.

If you attempted to read the state of the detectors in this transition region you would get wildly inaccurate indications of where the shaft was pointing, as illustrated in Figure III.

The solution to this problem is to make the tracks change in a different sequence to the binary one. In fact we need to ensure that at any sector boundary only one detector is being changed, and in that way we won't get a radically wrong reading.

There are many such sequences that cover all possible combinations of detector states, known as unit distance codes or sometimes Gray codes, after the mathematician who investigated them.

If you remember last month we looked at Carnot maps. The special

THE BEEB BODY BUILDING COURSE

property of these are that adjacent cells differ by only one variable, so to generate a unit distance code we simply step through a Carnot map visiting each square only once and ending up at the square we started on.

The trail of this trip gives us our unit distance code. It's rather like a knight's tour on the chess board. As you can see there can be many such paths, especially when you remember that the two opposite edges of the map are also adjacent.

As we are going to put our code sequence on to the tracks of a disc it would be better if the inner tracks did not change as much as the outer ones. Figure IV shows the path and code sequence I used.

This sequence is plotted on to the disc and shown in Figure V. By convention a disc with a unit distance code on it is known as a Gray disc no matter what colour it is.

The final components in our system are the light emitters and detectors. For these I chose a matched pair of infra red emitter/detectors type H23A1 – see Figure VI – as they were the cheapest that would do the job, but virtually any type would do.

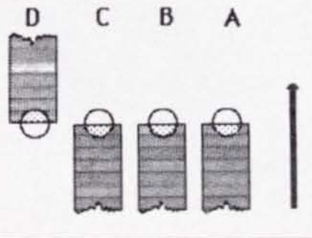
The detector is a photo transistor that can be connected directly to the user port. The simple electrical circuit is shown in Figure VII. The brightness of the emitters is controlled by the resistor, and I got good results with the value shown.

However as you can't see infra red light it can be tricky. If you are having difficulty with the transistors switching on you could increase the emitter brightness by reducing the resistor value. You can go down to about 75R.

Alternatively you might have trouble with stray light affecting the other sensors, in which case you can increase the value of the resistor. The detectors should be connected to the user port, noting that detector A is for the outer track and detector D is for the inner.

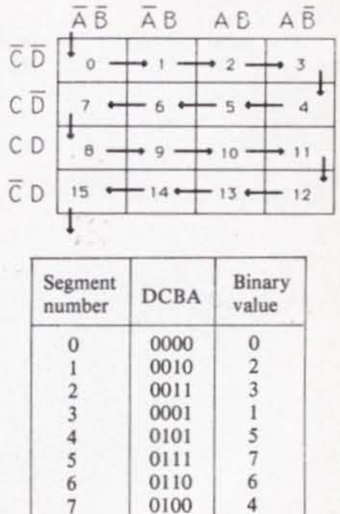
Connection to the user port can be made with Body Build packs 1 and 2 – see last month – or more cheaply with an IDC (Insulation Displacement Cable) socket and ribbon cable, as described in the August 1986 issue.

Now we have sorted out all the components of our computerised weather vane we have to put them all



D	C	B	A	Sector
0	1	1	1	7
0	1	0	1	5
1	0	0	1	1
1	0	0	0	8

Figure III: Possible transitions with a binary disc



Segment number	DCBA	Binary value
0	0000	0
1	0010	2
2	0011	3
3	0001	1
4	0101	5
5	0111	7
6	0110	6
7	0100	4
8	1100	12
9	1110	14
10	1111	15
11	1101	13
12	1001	9
13	1011	11
14	1010	10
15	1000	8

Figure IV: Generation of a unit distance code

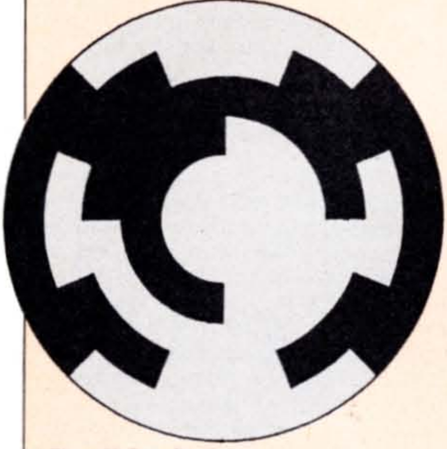


Figure V: Gray disc

From Page 119

together. There are many ways of constructing this device. I used a similar construction technique to the anemometer, that of brass rods and tubes.

These can be bought in any model shop in sizes such that the rods fit quite neatly into the tubes to form bearings. The cross piece is made from 1/16in rod and the tail is fixed on using solder or epoxy resin.

If you cut a small slot out of the tail the rod will fit in neatly, giving plenty of room for a fillet of solder or glue, as well as presenting a symmetrical side to the wind. There is room for being artistic about the design of the tail.

I modelled the nose of the weather vane from epoxy putty. This comes in a two colour strip which is kneaded together before use. It can then be moulded just like putty and enough placed on the end of the cross rod to balance the tail. The putty is pliable for about two hours, and in 24 hours it will set rock hard.

The idea is to give the nose minimum wind resistance while balancing up the tail, and it's best to aim for a small, light cross rod. Now cut a small section of tube about 1/2in. This can be done by rolling a sharp art knife over the tube.

Remove the inside burr from both pieces with a round needle file, and this will form the bearing for the weather vane. Slide this small piece over the 3/32in down rod and fix them both to the cross rod again with epoxy, solder or in my case both.

However make sure that you solder first, as it does not take kindly to epoxy. If you like you can use more of the putty to do the job.

The down rod fits into the 3/32in internal diameter tube, which is in turn soldered on to the veroboard to hold it rigid. A disc is cut out of thin perspex and the tracks drawn on using indian ink. Alternatively you can copy the disc on to film and stick this on to the perspex using the black areas to hold the glue.

At the centre of the perspex disc I glued a stopper to allow it to be connected to the rod. I used the centre piece of a screw connector block for this. The detectors were mounted on the veroboard, the holes making it very easy to align them at the same point.

The emitters were mounted on a separate piece of veroboard and attached to the first piece using thick tinned copper wire. This allowed the disc to be first mounted, then the detectors were put in place by bending the wires.

Once the system is up and running you might like to reinforce this arrangement with a more rigid one. The assembly can be seen in Figure VIII. Finally the whole thing can be mounted into a box. A drop of light oil reduces the friction and I found I was able to detect very light winds.

All the components needed to build the weather vane are available as Body Build Pack 34. The order form can be found on page 149. As I envisage the most difficult component to get hold of will be the emitter/detectors these are available separately.

Having aligned the weather vane with a compass the next job is to read the information into the micro. Program I is a simple routine to decipher the unit distance code used in the Gray disc.

The idea is that the code is first converted into a binary number by means of a look-up table. This is done by reading a direction string into an array in a position corresponding to the unit distance code.

If we have the code from the weather vane we simply use it as the array index to print the direction. If you want a number to indicate the direction just use a numeric array instead of a string array.

If you find the readings going

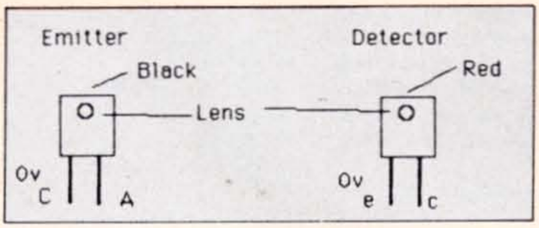


Figure VI: The H23A1 matched infra red emitter/detector pair

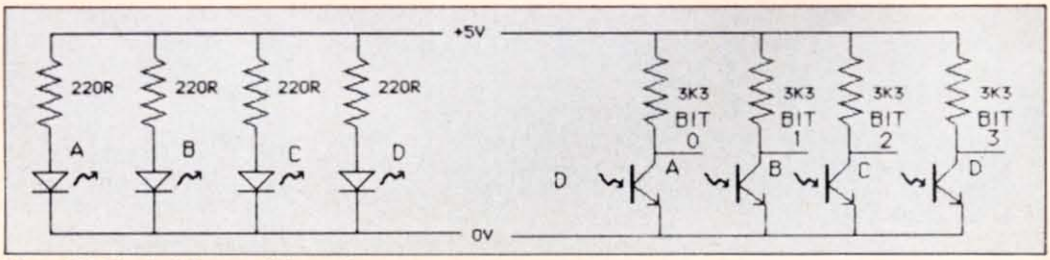


Figure VII: Electrical diagram of the weather vane

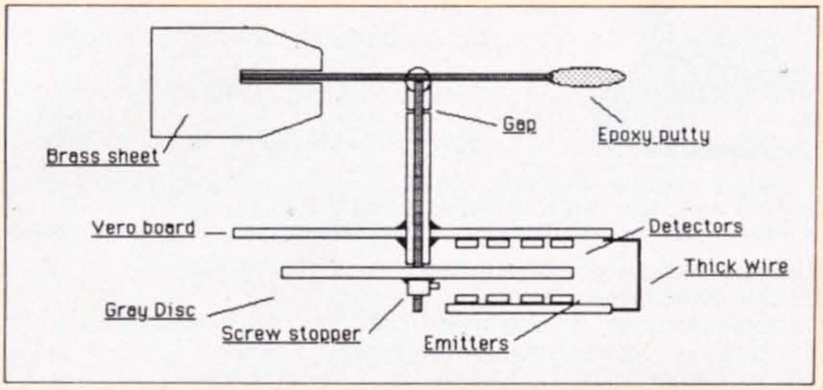


Figure VIII: Mechanical diagram of the weather vane

clockwise as you turn the vane anti-clockwise this means you have got the disc on the wrong way round. To rectify matters you can reverse it or simply reverse the order of the strings in the array.

You can make the program more visually appealing by adding a graphic pointer in the direction of the wind. Or how about logging the wind direction on a disc file along with the time and wind speed and pressure?

● *But then as I always say the fun starts in these projects when you start adding something of your own. When the wind stops I'll see you next month.*

```
  10 MODE 7
  20 PRINT
  30 PRINT"BODY BUILDING COURSE"
  40 PRINT"COMPUTER WEATHER VANE"
  50 PRINT"By Mike Cook"
  60 ?&FE62=00
  70 DIM DIR$(15)
  80 L%=255
  90 FOR A=0 TO 15
 100 READ DIR$(A)
 110 NEXT
 120 REPEAT
 130 D%=?&FE60 AND &F
 140 IF D%<>L% THEN PROC_REPORT
 150 UNTIL FALSE
 160 DEF PROC_REPORT
 170 L%=D%
 180 PRINTTAB(0,10);"Wind Direction
is ";DIR$(D%);SPC(20)
 190 ENDPROC
 200 DATA NORTH,NWW,NNW,NW,SSW,WEST,
SW,SWW
 210 DATA NNE,EAST,NE,NEE,SOUTH,SEE,
SSE,SE
```

Program I

Body Build Pack 34
– the weather vane – contains:

- *4 off emitter/detector pairs – 8 components.*
- *1 piece of sheet brass.*
- *1 piece of vero board.*
- *3in 3/32in brass rod and tube.*
- *4in 1/16in brass rod.*
- *1 3in square piece of thin perspex.*
- *1 screw stopper.*
- *1 Gray disc printed on film.*
- *8 resistors.*
- *1 length of tinned copper.*
- *1 box.*
- *1 piece of epoxy putty.*

Price £16.50. Also available:

- *4 detector/emitter pairs – 8 components. £9.50.*
- *Body Build Pack 1 – user port transition board. £9.99.*
- *Body Build Pack 2 – user port cable. £8.99.*

All prices include VAT and P&P.
Make cheques payable to Musbury Consultants and send to: 8 Fairhill, Helmshore, Rossendale, Lancs. BB4 4JX. Foreign orders add £3 if airmail delivery is required.

PROBLEM

MY BBC B issue 7, OS1.2, will load normal programs from a cassette but it will not load Melbourne House's Exploding Fist game which has a special loading system.

I have established that the fault is inside the computer because the game has been successfully loaded on other BBC Micros using my cassette recorder and leads.

The IC35 (LM324) which is used as a signal conditioner has been replaced but the fault was not cleared. The dc offset voltage on the operational amplifiers using IC35 is 4.5 mV measured using a digital multimeter.

The voltage waveform at pin 8 or pin 14 of IC35 is a pure sine-wave when loading a normal program or a sinusoidal signal superimposed over a higher frequency signal when trying to load Fist.

The waveforms are square at pin 1 of IC35 or at pin 12 of the ULA serial interface chip. The voltge waveform at pin 15 of the ULA is a very high frequency signal of low amplitude.

The ULA serial interface chip is rather expensive to replace, especially when not absolutely sure that the fault is inside this chip. Have you any idea of what the cause of this problem may be? _ Nicholas Louka, Rugby, Works.

SOLVED

At one time Acorn produced a ULA that was more fussy about its tones. This would not work with some software protection methods used. It sounds like you have one of these.

There is nothing wrong with it and it is not faulty – it was just designed that way. If you get it replaced tell your dealer to make sure it is one that will load your game.

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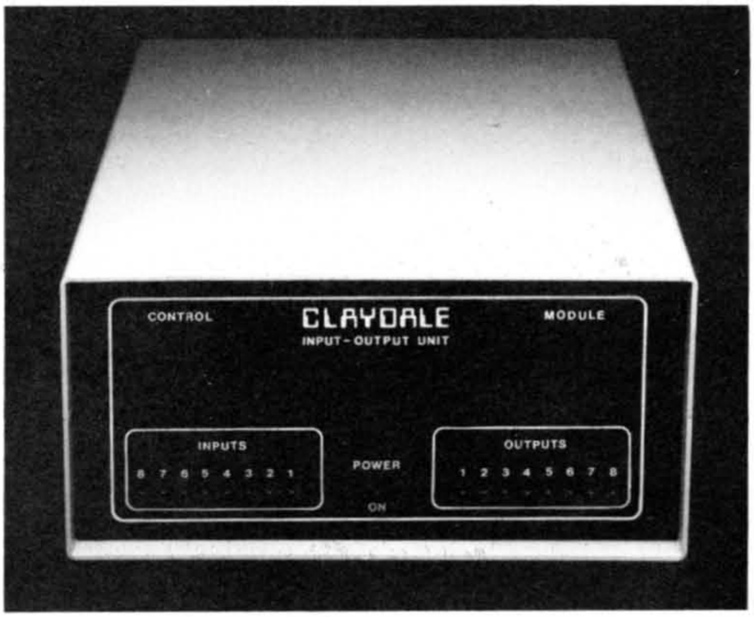
'Sink The Bismarck' is an accurate simulation of conditions in the North Atlantic in May 1941, including U-boats to harass your battleships, weather and fuel considerations, and troop and supply convoys which you must protect from the German battleship, which was regarded as the most powerful vessel afloat at the time. You have twelve British ships, each with their own strengths and weaknesses with which to scour the North Atlantic 1500 miles wide!

The program is compatible with the BBC B, B+64K, B+128K and MASTER 128 machines, and with the Acorn DFS, Watford DFS/DDFS, Opus DDOS, Solidisk DFS and the ADFS, and should be compatible with all other systems.

£10.99 plus £1.00p&p

Available from: Design People Software, 77 Grimwade Street, Ipswich, Suffolk IP4 1LN or from good distributors.



Give your BBC the power to switch power

JOE PRITCHARD reviews the Claydale In/Out module

Product: Claydale In/Out Module
Price: £165
Supplier: Claydale Electronics, Unit 1, Bidewell Close, Drayton High Road, Norwich. Tel: 060-386 8423

THE Claydale In/Out module aims to offer BBC Micro users interested in controlling and monitoring other appliances the hardware needed to interface everything together.

The first thing to say is that this 1 MHz bus-based I/O unit puts the hard back into hardware. Metal cased, it looks well built and is designed to last – it clangs if you tap it with your knuckles.

It offers you 8 bit TTL input, and 8 SPDT relay outputs that have the capability of switching 240V at a current of up to 10 amps. The status of these ins and outs is monitored on 16 LEDs mounted on the front panel. More on these facilities later.

The access address of the module on the bus can be set to one of eight possible addresses by altering an internal eight way switch. This should take care of any compatibility problems between this and other devices, such as teletext decoders, and the like.

Using the bus will also allow the addition of up to seven more Claydale units should the desire to switch up to 64 such outputs prove irresistable.

An internal inspection showed the circuit board to be well designed and labelled, with the I/O work being done by a 6821 PIA. The labels were such that the function of each device on the board was quite plain – a nice feature in these days of black box technology.

The equipment also appears to conform to the Acorn 1 MHz bus specification – no power is drawn from the computer, a bus extension is made available and loading of the bus would appear to be quite light.

The documentation is brief but adequate, indicating the way in which the module can be accessed from software and the power supply requirements of the unit. However I did feel that a little information on programming the 6821 and how it was used in this module, and possibly a circuit diagram, might be useful.

So on to performance. The module requires 5V at a little under 1 amp. This relatively high power consumption is explained by the current needed for the output relays. I used the disc drive power outlet on the BBC Micro for this 5V.

The ribbon cable provided was just about long enough for comfortable use, and fitted smoothly into the socket on the BBC Micro.

The documentation mentions the use of ? to access the I/O ports and this is adequate as long as your software isn't running on a second processor. If it is you'll have to use the relevant OS calls.

Writing to the output is simplicity itself – ?&FC00=255 turns all the relays on, and ?&FC00=0 turns them all off. A simple routine such as:

```
FOR I%=0 TO 255:
?&FC00=I%:NEXT I%
```

will run through all possible combinations of output relays.

The status of the relays is also reflected in the LEDs on the front panel of the module. The relay action sounds very firm, with no jitter and no interference to the computer when relays were turned off. Diode protection is present on each relay coil.

The relay outputs are single pole double throw – think of this as a two way switch. My main complaint is that the outputs, which might be carrying mains voltges, are screw terminals on the rear of the module.

For some applications these might be a little too accessible. However for light

→

From Page 123

industrial control, or domestic use where you keep the rear of the unit out of the way of prying hands, this should be no problem. After all we turn off mains power before adjusting any connections, don't we?

In schools it's doubtful that mains voltages would be used for demonstration purposes – 24 volts has often been suggested as the highest safe voltage that will mix with school children.

The maximum current rating of the relays of 10 A would appear to preclude the control of large motors, and so on, which often pull a high current when switched on.

The input facility is a great asset. Each input is opto-isolated, and it's 0V line also appears to be independent. To switch an input high a 5V TTL signal is applied to the relevant terminals, which are again screw terminals on the back of the unit. The use of opto-isolation provides a degree of safety between the outside world and the computer. The inputs are read from port B of the 6821, and software is given in the documentation.

It is necessary to configure the port for input by writing a value of 4 to &FC03. After this a read from &FC02 returns the status of the different input port bits.

As with the outputs the status of the input bits is reflected in eight front panel LEDs. The only problem is that with all the inputs low the computer returns a value of 255.

For example, taking bit 0 high, which turns the corresponding LED on, returns the equivalent bit to the computer set to 0. In this case the value 254 would be returned. A software fix for this is given in the documentation, and in practice it is no real problem.

I experienced a potential problem with the electrical characteristics of the input. The TTL signal supplied must be capable of providing sufficient current to turn on the opto-isolator's LED.

Signals of 5V magnitude provided by LS TTL or CMOS gates might not provide sufficient current drive for the LED. If this were the case the 6821 would still see a low input from the opto-isolator. Apart from this though the input side of the module proved to be reliable and effective.

The Claydale module provides a useful input/output facility for the BBC Micro, and deserves close examination for any application that might involve the switching of devices more powerful than LEDs.

I would certainly prefer a different means of connecting the mains potential voltages than the screw terminals, and I believe that this might be in the offing.

However putting these reservations aside the unit should provide a useful solution to any control application that requires the switching of low to medium current mains voltages. ■

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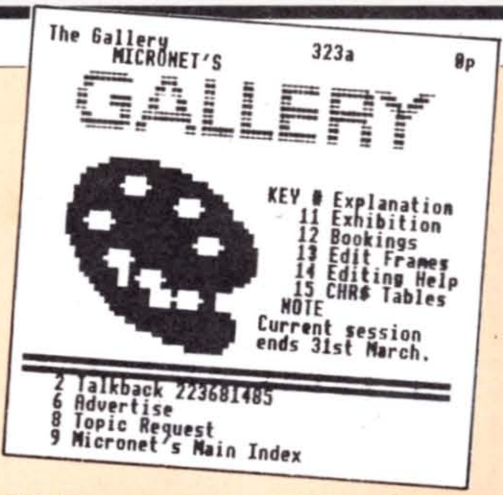
From Page 51

Listing I

```
100 REM **********************
110 REM *                    *
120 REM * MODE 7 Screen Dump *
130 REM *                    *
140 REM *   By Robin Nixon   *
150 REM *                    *
160 REM * (c) The Micro User *
170 REM *                    *
180 REM **********************
190 REM
200 MODE 7
210 DIM os% 20
220 char255=&CF8
230 screen0=&70
240 screen1=&7C00
250 screen2=&5400
260 osascii=&FFE3
270 osnewl =&FFE7
280 oswrch =&FFEE
290 osword =&FFF1
300 osbyte =&FFF4
310 FOR pass%=0 TO 2 STEP 2
320 P%=&1100
330 [
340 OPT pass%
350 LDA #88
360 STA &5
370 STA &7
380 LDA #&7C
390 STA scr1+2
400 LDA #&54
410 STA scr2+2
420 LDY #0
430 STY sepcont
440 STY alphgraph
450 STY normdoub
460 STY conceal
470 LDA #40
480 STA counter
490 \
500 .scr1
510 \
520 LDA screen1,Y
530 \
540 .scr2
550 \
560 STA screen2,Y
570 INY
580 BNE scr1
590 LDA scr1+2
600 CMP #&7F
610 BEQ copied
620 INC scr1+2
630 INC scr2+2
640 JMP scr1
650 \
660 .copied
670 \
680 LDA #22
690 JSR oswrch
700 LDA #4
710 JSR oswrch
720 LDA #&54
730 STA read1+2
740 LDY #0
750 \
760 .read
770 \
780 TYA
790 PHA
800 \
810 .read1
820 \
830 LDA 0,Y
840 STA graphchar
850 JSR test
860 DEC counter
870 BNE read2
880 LDA #40
890 STA counter
900 LDA #0
910 STA alphgraph
920 STA sepcont
930 STA normal
940 STA conceal
950 LDA normdoub
960 BEQ read2
970 INC normdoub
980 LDA normdoub
990 CMP #3
1000 BNE read2
1010 LDA #0
1020 STA normdoub
1030 \
1040 .read2
1050 \
1060 PLA
1070 TAY
1080 INY
1090 BNE read
1100 LDA read1+2
1110 CMP #&57
1120 BEQ readover
1130 INC read1+2
1140 LDY #0
1150 JMP read
1160 \
1170 .readover
1180 \
1190 LDA #2
1200 JSR oswrch
1210 LDY #0
1220 \
1230 .print1
1240 \
1250 LDA #1
1260 JSR oswrch
1270 LDA setup1,Y
1280 JSR oswrch
1290 BEQ print2
1300 INY
1310 JMP print1
1320 \
1330 .print2
1340 \
1350 LDA #25
1360 STA rows
1370 LDA #0
1380 STA screen0
1390 LDA #&58
1400 STA screen0+1
1410 \
1420 .print3
1430 \
1440 LDY #0
1450 \
1460 .print3a
1470 \
1480 LDA #1
1490 JSR oswrch
1500 LDA setup2,Y
1510 JSR oswrch
1520 BEQ print3b
1530 INY
1540 JMP print3a
1550 \
1560 .print3b
1570 \
1580 LDA #40
1590 STA columns
1600 \
1610 .print4
1620 \
1630 LDA #8
1640 STA offset
1650 LDA #&80
1660 STA check
1670 \
1680 .print5
1690 \
1700 LDY #0
1710 LDA #&80
1720 STA check1
1730 STY graphchar
1740 \
1750 .print6
1760 \
1770 LDA (screen0),Y
1780 BIT check
1790 BEQ notset
1800 LDA graphchar
1810 CLC
1820 ADC check1
1830 STA graphchar
1840 \
1850 .notset
1860 \
1870 LDA check1
1880 LSR A
1890 STA check1
1900 INY
1910 CPY #8
1920 BNE print6
1930 LDA check
1940 LSR A
1950 STA check
1960 LDA #1
1970 JSR oswrch
1980 LDA graphchar
1990 JSR oswrch
2000 DEC offset
2010 BNE print5
2020 LDA screen0
2030 CLC
2040 ADC #8
2050 STA screen0
2060 BCC print7
2070 INC screen0+1
2080 \
2090 .print7
2100 \
2110 DEC columns
2120 BNE print4
2130 LDA #30
2140 JSR oswrch
2150 LDA #13
2160 JSR osascii
2170 DEC rows
2180 BEQ quit
2190 JMP print3
2200 \
2210 .quit
2220 \
2230 LDA #3
2240 JSR oswrch
2250 RTS
2260 \
2270 .setup1
2280 \
2290 OPT FNequb(27)
2300 OPT FNequb(65)
2310 OPT FNequb(8)
2320 OPT FNequb(0)
2330 RTS
2340 \
2350 .setup2
2360 \
2370 OPT FNequb(27)
2380 OPT FNequb(76)
2390 OPT FNequb(65)
2400 OPT FNequb(1)
2410 OPT FNequb(0)
2420 \
```



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6 Advertise
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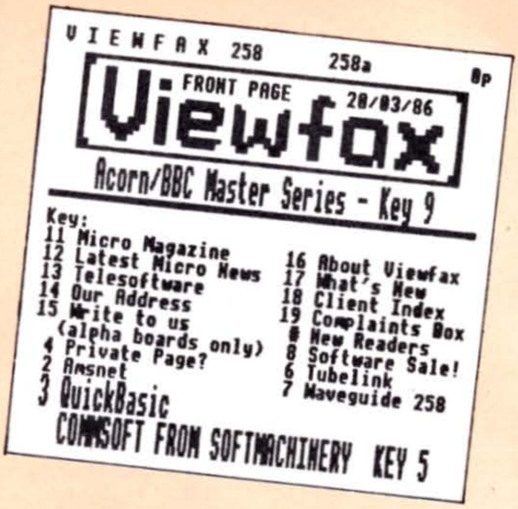
9 Micronet's Main Index

```
2430 .test
2440 \
2450 LDA graphchar
2460 CMP #&FF
2470 BNE test1
2480 STA graphchar
2490 JSR graphics
2500 LDA #&FF
2510 STA graphchar
2520 \
2530 .test1
2540 \
2550 CMP #32
2560 BCC testexit
2570 CMP #145
2580 BCC notgraph
2590 CMP #152
2600 BCS notgraph
2610 LDA #1
2620 STA alphgraph
2630 \
2640 .testexit
2650 \
2660 LDA #32
2670 JMP oswrch
2680 \
2690 .notgraph
2700 \
2710 CMP #160
2720 BCS notcode
2730 CMP #128
2740 BCC notcode
2750 CMP #153
2760 BNE notcontig
2770 LDA #0
2780 STA sepcont
2790 JMP testexit
2800 \
2810 .notcontig
2820 \
2830 CMP #154
2840 BNE notseparated
2850 LDA #1
2860 STA sepcont
2870 JMP testexit
2880 \
2890 .notseparated
2900 \
2910 CMP #152
2920 BNE notconceal
2930 LDA #1
2940 STA conceal
2950 JMP testexit
2960 \
2970 .notconceal
2980 \
2990 CMP #141
3000 BNE notdoub
3010 LDA normdoub
3020 BNE testexit
3030 INC normdoub
3040 LDA #0
3050 STA conceal
3060 JMP testexit
3070 \
3080 .notdoub
3090 \
3100 CMP #140
3110 BNE notnormal
3120 LDA #1
3130 STA normal
3140 LDA #0
3150 STA conceal
3160 JMP testexit
3170 \
3180 .notnormal
3190 \
3200 CMP #129
3210 BCC testexit
3220 CMP #136
3230 BCS testexit
3240 LDA #0
3250 STA alphgraph
3260 STA conceal
3270 JMP testexit
3280 \
3290 .notcode
3300 \
3310 LDA alphgraph
3320 BEQ notcode0
3330 LDA graphchar
3340 JMP nothash
3350 \
3360 .notcode0
3370 \
3380 LDA graphchar
3390 CMP #224
3400 BNE notdash
3410 LDA #96
3420 \
3430 .notdash
3440 \
3450 CMP #223
3460 BNE nothash
3470 LDA #95
3480 \
3490 .nothash
3500 \
3510 CMP #219
3520 BCC nothash1
3530 CMP #223
3540 BCS nothash1
3550 SEC
3560 SBC #&80
3570 \
3580 .nothash1
3590 \
3600 CMP #&FF
3610 BEQ notcode1
3620 CMP #&F6
3630 BCC notcode1
3640 SEC
3650 SBC #&80
3660 \
3670 .notcode1
3680 \
3690 CMP #91
3700 BCC notcode2
3710 CMP #96
3720 BCS notcode2
3730 CLC
3740 ADC #155
3750 \
3760 .notcode2
3770 \
3780 CMP #123
3790 BCC notcode3
3800 CMP #127
3810 BCS notcode3
3820 CLC
3830 ADC #&80
3840 \
3850 .notcode3
3860 \
3870 CMP #35
3880 BNE notcode4
3890 LDA #96
3900 JMP notcode6
3910 \
3920 .notcode4
3930 \
3940 CMP #96
3950 BNE notcode5
3960 LDA #250
3970 JMP notcode6
3980 \
3990 .notcode5
4000 \
4010 CMP #250
4020 BNE notcode6
4030 LDA #35
4040 \
4050 .notcode6
4060 \
4070 STA graphchar
4080 LDA alphgraph
4090 BEQ nc1
4100 LDA graphchar
4110 CMP #224
4120 BCS dographics
4130 CMP #192
4140 BCS nc1
4150 CMP #95
4160 BCS dographics
4170 CMP #64
4180 BCS nc1
4190 \
4200 .dographics
4210 \
4220 CMP #246
4230 BCC dograph1
4240 CMP #255
4250 BEQ dograph1
4260 CMP #250
4270 BCS dograph1
4280 JMP nc1
4290 \
4300 .dograph1
4310 \
4320 JSR graphics
4330 LDA #&FF
4340 STA graphchar
4350 \
4360 .nc1
4370 \
4380 LDA normdoub
4390 BEQ nc2
4400 LDA normal
4410 BNE nc2
4420 LDA graphchar
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

From Page 127

```
4430 CMP #&F6
4440 BCS udc
4450 AND #&7F
4460 \
4470 .udc
4480 \
4490 STA matrix
4500 LDX #matrix MOD &100
4510 LDY #matrix DIV &100
4520 LDA #&A
4530 JSR osword
4540 LDY #0
4550 LDA normdoub
4560 CMP #1
4570 BEQ nc1a
4580 LDY #4
4590 \
4600 .nc1a
4610 \
4620 LDA #4
4630 STA counter1
4640 LDA #23
4650 JSR oswrch
4660 LDA #255
4670 STA graphchar
4680 JSR oswrch
4690 \
4700 .doubleloop
4710 \
4720 LDA matrix+1,Y
4730 JSR oswrch
4740 JSR oswrch
4750 INY
4760 DEC counter1
4770 BNE doubleloop
4780 \
4790 .nc2
4800 \
4810 LDA graphchar
4820 CMP #163
4830 BNE nc2a
4840 LDA #96
4850 \
4860 .nc2a
4870 \
4880 CMP #&F6
4890 BCS nc3
4900 AND #&7F
4910 \
4920 .nc3
4930 \
4940 PHA
4950 LDA conceal
4960 BEQ nc4
4970 PLA
4980 JMP testexit
4990 \
5000 .nc4
5010 \
5020 PLA
5030 JMP oswrch
5040 \
5050 .graphics
5060 \
5070 LDY #8
5080 LDA #0
5090 \
5100 .clear
5110 \
5120 STA char255-1,Y
5130 DEY
5140 BNE clear
5150 LDA graphchar
5160 AND #&7F
5170 SEC
5180 SBC #32
5190 CMP #32
5200 BCC bit1
5210 SEC
5220 SBC #32
5230 \
5240 .bit1
5250 \
5260 STA graphchar
5270 LDA #1
5280 BIT graphchar
5290 BEQ bit2
5300 LDA char255
5310 ORA #&F0
5320 STA char255
5330 LDA char255+1
5340 ORA #&F0
5350 STA char255+1
5360 LDA char255+2
5370 ORA #&F0
5380 STA char255+2
5390 \
5400 .bit2
5410 \
5420 LDA #2
5430 BIT graphchar
5440 BEQ bit3
5450 LDA char255
5460 ORA #&F
5470 STA char255
5480 LDA char255+1
5490 ORA #&F
5500 STA char255+1
5510 LDA char255+2
5520 ORA #&F
5530 STA char255+2
5540 \
5550 .bit3
5560 \
```



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COMMSOFT FROM SOFTMACHINERY KEY 5

```
5570 LDA #4
5580 BIT graphchar
5590 BEQ bit4
5600 LDA char255+3
5610 ORA #&F0
5620 STA char255+3
5630 LDA char255+4
5640 ORA #&F0
5650 STA char255+4
5660 \
5670 .bit4
5680 \
5690 LDA #8
5700 BIT graphchar
5710 BEQ bit5
5720 LDA char255+3
5730 ORA #&F
5740 STA char255+3
5750 LDA char255+4
5760 ORA #&F
5770 STA char255+4
5780 \
5790 .bit5
5800 \
5810 LDA #16
5820 BIT graphchar
5830 BEQ bit6
5840 LDA char255+5
5850 ORA #&F0
5860 STA char255+5
5870 LDA char255+6
5880 ORA #&F0
5890 STA char255+6
5900 LDA char255+7
5910 ORA #&F0
5920 STA char255+7
5930 \
5940 .bit6
5950 \
5960 LDA #32
5970 BIT graphchar
5980 BEQ separated
5990 LDA char255+5
6000 ORA #&F
6010 STA char255+5
6020 LDA char255+6
6030 ORA #&F
6040 STA char255+6
6050 LDA char255+7
6060 ORA #&F
6070 STA char255+7
6080 \
6090 .separated
6100 \
6110 LDA sepcont
6120 BNE sep1
6130 RTS
6140 \
6150 .sep1
6160 \
6170 LDY #8
6180 \
6190 .seploop
6200 \
6210 LDA char255-1,Y
6220 AND #&77
6230 STA char255-1,Y
6240 DEY
6250 BNE seploop
6260 LDA #0
6270 STA char255+2
6280 STA char255+4
6290 STA char255+7
6300 RTS
6310 \
6320 .graphchar
6330 \
6340 OPT FNequb(0)
6350 \
6360 .sepcont
```

```
6370 \
6380 OPT FNequb(0)
6390 \
6400 .alphgraph
6410 \
6420 OPT FNequb(0)
6430 \
6440 .normdoub
6450 \
6460 OPT FNequb(0)
6470 \
6480 .counter
6490 \
6500 OPT FNequb(40)
6510 \
6520 .counter1
6530 \
6540 OPT FNequb(4)
6550 \
6560 .normal
6570 \
6580 OPT FNequb(0)
6590 \
6600 .rows
6610 \
6620 OPT FNequb(0)
6630 \
6640 .columns
6650 \
6660 OPT FNequb(0)
6670 \
6680 .offset
6690 \
6700 OPT FNequb(0)
6710 \
6720 .check
6730 \
6740 OPT FNequb(0)
6750 \
6760 .check1
6770 \
6780 OPT FNequb(0)
6790 \
6800 .conceal
6810 \
6820 OPT FNequb(0)
6830 \
6840 .matrix
6850 \
6860 OPT FNequb(0)
6870 OPT FNequw(0)
6880 OPT FNequw(0)
6890 OPT FNequw(0)
6900 OPT FNequw(0)
6910 ]
6920 NEXT
6930 *TV0,1
6940 MODE7
 6950 PROCudcs
 6960 DIM A$(31)
 6970 X%=1
 6980 FOR N%=1 TO 2
 6990 PRINTSPC8CHR$141CHR$132"MODE 7
Screen Dump":NEXT
 7000 PRINT''
 7010 PRINT"Enter filenames of screen
s to dump."
 7020 PRINT''"Press RETURN on its own
to end."
 7030 PRINT''
 7040 REPEAT X$=STR$(X%)
 7050 IF LENX$<2 X$=" "+X$
 7060 PRINT"Screen "X$;:INPUTA$(X%)
 7070 X%=X%+1
 7080 UNTILX%=32 OR A$(X%-1)=""
 7090 N1%=X%-1:IF A$(N1%)="" N1%=N1%-
1
 7100 CLS:VDU 23;8202;0;0;0;
 7110 ON ERROR PRINT STRING$(120,CHR$
255):VDU 31,10,1,136:PRINTA$(N%)" not
 found";:VDU 137,7,13,10,10:END
 7120 PROCcheck
 7130 ON ERROR OFF
 7140 FOR N%=1 TO N1%
 7150 MODE7
 7160 PROCoscli(A$(N%))
 7170 CALL &1100
 7180 VDU 30,2
 7190 FOR X%=1 TO 8
 7200 PRINT
 7210 NEXT
 7220 VDU 3
 7230 NEXT
 7240 VDU 2,12,3
 7250 RUN
 7260 DEF PROCoscli(oscli$)
 7270 $os%="*LOAD "+oscli$+" 7C00"
 7280 X%=os% MOD &100
 7290 Y%=os% DIV &100
 7300 CALL &FFF7
 7310 ENDPROC
 7320 DEF PROCcheck
 7330 FOR N%=1 TO N1%
 7340 PROCoscli(A$(N%))
 7350 NEXT
 7360 ENDPROC
 7370 DATA 0,24,48,126,126,48,24,0,64
,64,76,82,66,4,8,30,0,24,12,126,126,1
2,24,0,0,24,60,126,90,24,24,0,0,0,0,2
54,254,0,0,0,32,32,32,34,38,10,15,2,4
0,40,40,40,40,40,40,0,96,16,96,18,102
,10,15,2,0,16,0,124,124,0,16,0
 7380 DEF PROCudcs
 7390 FORX%=&CB0 TO &CF7
 7400 READ ?X%
 7410 NEXT
7420 ENDPROC
7430 DEF FNequb(byte%)
7440 ?P%=byte%
7450 P%=P%+1
7460 =pass%
7470 DEF FNequw(word%)
7480 ?P%=word% MOD &100
7490 P%=P%+1
7500 ?P%=word% DIV &100
7510 P%=P%+1
7520 =pass%
```

Listing II

```
1190 LDA #30
1200 JSR oswrch
1210 LDA #2
1220 JSR oswrch
1230 LDY #0
1240 \
1250 .print1
1260 \
1270 LDA #1
1280 JSR oswrch
1290 LDA setup1,Y
1300 JSR oswrch
1310 BEQ print2
1320 INY
1330 JMP print1
1340 \
1350 .print2
1360 \
1370 LDY #0
1380 STY screen0
1390 LDA #&58
1400 STA screen0+1
1410 LDA #25
1420 STA rows
1430 \
1440 .print3
1450 \
1460 LDA #8
1470 STA counter
1480 \
1490 .print4
1500 \
1510 LDA #40
1520 STA columns
1530 \
1540 .print5
1550 \
1560 LDA #1
1570 JSR oswrch
1580 LDA (screen0),Y
1590 JSR oswrch
1600 DEC columns
1610 BNE print6
1620 DEC counter
1630 BNE print5a
1640 DEC rows
1650 BNE notquit
1660 RTS
1670 \
1680 .notquit
1690 \
1700 LDA screen0
1710 CLC
1720 ADC #1
1730 STA screen0
1740 LDA screen0+1
1750 ADC #0
1760 STA screen0+1
1770 JMP print3
1780 \
1790 .print5a
1800 \
1810 LDA screen0
1820 SEC
1830 SBC #55
1840 STA screen0
1850 LDA screen0+1
1860 SBC #1
1870 STA screen0+1
1880 JMP print4
1890 \
1900 .print6
1910 \
1920 LDA screen0
1930 CLC
1940 ADC #8
1950 STA screen0
1960 LDA screen0+1
1970 ADC #0
1980 STA screen0+1
1990 JMP print5
2000 \
2010 .setup1
2020 \
2030 OPT FNequb(27)
2040 OPT FNequs("624;40;25")
2050 OPT FNequb(27)
2060 OPT FNequb(ASC"Z")
2070 OPT FNequb(0)
```

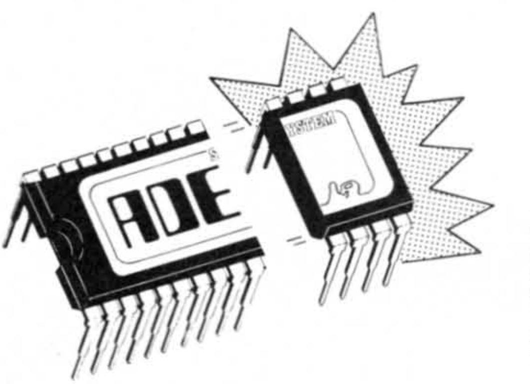
Listing III

```
7530 DEF FNequs(string$)
7540 $P%=string$
7550 P%=P%+LEN string$
7560 =pass%
```

This listing is included in this month's cassette tape offer. See order form on Page 156.

☆ ☆ ☆ ☆ SUMMER SEASON SALE OFFER ☆ ☆ ☆ ☆

1/3 OFF ALL ROM's!



ADE
£40

ADE is the complete program development package for assembly language programmers. Proven and revised over a period of 2½ years ADE has set the standard by which all others are judged. If you are writing 10 lines or 10,000 lines of source code ADE is for you. The powerful EDITOR, macro ASSEMBLER and DEBUGGER are amazing value at this price. ADE comes complete with a 160 page comprehensive reference manual and a utility/macro library disc. Please specify 40 or 80T.

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ASM provides all the features of the ADE macro assembler. Use with other editors such as View and Wordwise. For enhanced debugging facilities use with the SPY2 ROM. Complete with reference manual and utility disc. Please specify 40 or 80T.

SPY2
£20

SPY2 is the most comprehensive of all debugging/disc utility ROMs. Apart from the full front panel debugging monitor SPY2 features single-step, multiple break-points, relocator, trace and 'versatile' dissassembly facilities. The powerful set of disc recovery commands can be used for interrogating, editing and retrieving data stored on disc. Only available to 8271 dfs users. SPY2 also includes a disc formatter and a non-destructive single track reformatter.

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PINEAPPLE SOFTWARE

Programs for the BBC models 'B' with disc drive with FREE updating service on all software

DIAGRAM

Still the only drawing program available for the BBC micro which gives you the ability to draw really large diagrams and scroll them smoothly around the screen stopping to edit them at any time if required.

Pineapple's unique method of storing the diagram information on disc means that the size of diagrams is limited only by the free space on disc, and not the amount of computer memory you have available. (A blank 80 track disc will allow up to 39 mode 0 screens of diagram).

The superb print routines supplied with the program enable large areas of the diagram to be printed in a single print run in a number of different sizes and rotated through 90 deg. if required. Full use can also be made of printers which have a wider than normal carriage available.

The program is fully compatible with the Marconi Tracker ball described below.

PLEASE STATE 40 or 80 TRACK DISC & WHETHER STANDARD BBC or MASTER VERSION IS REQUIRED

PRICE £25.00 + VAT

DIAGRAM UTILITIES

A suite of six utility programs which add additional features to the 'Diagram' drawing program. The utilities include the saving and loading of areas of diagram to and from disc. The ability to display the whole of your large diagram on the screen at one time (in either 4★4 or 8★8 screen format). The addition of borders and screen indents to diagrams, and the ability to shift a whole diagram in any direction.

PRICE £10.00 + VAT

MARCONI TRACKER BALL

This high quality device comes with it's own Icon Artmaster drawing program and utilities to enable it to be used in place of keyboard keys, joysticks, or with your own programs.

PRICE £60.00 + VAT p&p £1.75
PRICE INCLUDING 'DIAGRAM' SOFTWARE £79.00 + VAT p&p £1.75

TRACKER BALL for MASTER series

The Pointer ROM is supplied instead of the Icon Artmaster disc and enables the Tracker ball to work directly with the MASTER series computers. (e.g. to use with TIMPAINT etc.). Prices are the same as for the standard tracker ball.

POINTER

The Pointer Rom is available separately for people already owning tracker balls, and comes with instructions for use with the MASTER computer.

PRICE £12.50 + VAT

PCB

This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

The program is supplied on EPROM and will run with any 32k BBC micro (including Master series). Also supplied is a disc containing a sample PCB layout to demonstrate the programs features.

By using an EPROM for the program code the maximum amount of RAM is available for storing component location and ASCII identification files etc. (Up to 500 components and 500 ASCII component descriptions may be stored for a given layout). These is no limit to the number of tracks for a given PCB, although the maximum size of board is restricted to 8" ★ 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 scale, enabling direct contact printing to be used on resist covered copper clad board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample prinouts.

PRICE £85.00 + VAT

CONVERTER LEADS

Converter leads to enable the Trackerball to run mouse software and the mouse to run trackerball software (inc. DIAGRAM). Please state which way round when ordering.

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BASIC COMPILER

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MicroLink
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NEWSLETTER

No. 14 October 1986

Helping relieve famine

MICROLINK was used to keep track of progress in a nationwide computer game marathon which raised more than £5,000 for Ethiopian famine relief.

The event involved micro owners all over the country playing the cult role-playing adventure Dungeons and Dragons.

Two teams of nine took part in a stamina-sapping Draganothon at the Trafalgar Square Community Centre in London and wrote themselves into the Guinness Book of Records after 84 continuous hours.

Other major Dragon Aid events were held simultaneously at Aberdeen and Basingstoke, and hundreds of mini marathons took place in family living rooms throughout Britain.

Organiser Adrian Mars said the on-line adventurers raised at least half of the £5,000 which will go to Bob Geldorf's Band Aid Trust.

RADIO FANS ARE TUNING IN TO MICROLINK

WHILE its 38,000 members communicate with one another across the ether, the Radio Society of Great Britain has been conducting its business closer to the ground via telephone, snail mail and traditional telex.

But all that is changing thanks to the society's group of mailboxes on MicroLink.

Chief excecutive David Evans says: "We are using MicroLink as a means of exchanging information between myself and a large number of members in the field who serve on our 16 committees, and other individuals both nationally and internationally.

"Being a commercial organisation, by law we cannot use the airwaves to conduct our business as the national organisation for radio amateurs in the UK.

"We represent the licensed amateur at government level and also publish books, magazines and technical material under 25 different titles.

"A remarkable two-thirds of our members are micro owners and we hope MicroLink will eventually be used for much of our committee work and the transmission of material for our publications, taking the place of ordinary telex and, to a certain extent, the telephone".

Sunny solution

OUT on the sunny Costa Blanca, David Corcoran is spreading the word about MicroLink to Spanish-based business people and fellow expatriates.

Corcoran, whose background is in insurance, believes there's a real need for fast reliable communications among a community that has strong ties with other countries, particularly the UK. He has been living in Alicante for 18 months, setting up a company providing computers, modems, acoustic couplers and comms software to Spanish residents with links abroad.

He has made MicroLink his choice as the recommended communications system for his clients, setting a target of 500 new mailboxes in the first year.

Sales link

WHEN MicroLink subscriber John Heritage heard that friends of his were having difficulty selling their house he came up with a bright idea.

Why not advertise the £84,950 det. des. res. in Fleet, Hampshire, on MicroLink's bulletin board? He duly did and within a few hours recorded more than 20 responses from other subscribers intrigued by the special offer of "at least three per cent discount" for MicroLink members.

But before the offers started rolling in the property was sold through normal channels.

Said the owner: "Even though it hasn't actually been sold through MicroLink, advertising it on the system seems to have proved a lucky talisman – there are two buyers fighting over who will get it at the moment".

Speeding health data

THE largest independent forecasting group in Europe has joined MicroLink in order to speed compilation of data for a major investigation of the health of the nation.

Henley Centre for Forecasting is looking into the whole issue of health, health care and lifestyles in the UK.

The task will take at least 18 months and has been commissioned by a number of leading companies in the pharmaceutical manufacturing and retailing sectors.

Henley Centre has made its worldwide reputation on the strength of its economic research and consultancy work, analysing markets and sales factors for its clients, particularly in the retail trade, marketing and advertising.

It also publishes a number of periodicals of general economic interest with special emphasis on the economies of the UK, EEC and East Asian countries.

MicroLink will enable the centre to receive data via electronic mail from the consultants it employs to research particular issues and markets for its publications and confidential strategic reports.

YOUR chance to join MicroLink – Page 105

From Page 83

```
  10 REM ************************
  20 REM *      Witch Hunt       *
  30 REM *     BBC Model B       *
  40 REM *   By Stephen Gray     *
  50 REM * (C) MICRO USER 1986 *
  60 REM ************************
  70 REM *FX200 1
  80 VDU 23,225,64,255,191,165,173,1
65,237,64,23,226,239,239,239,0,254,25
4,254,0,23,227,126,129,153,165,165,15
3,129,126,23,228,170,85,170,85,170,85
,170,85,23,229,255,153,153,255,255,15
3,153,255
  90 HIMEM=&5400:FOR A=&5600 TO &57F
F:READB:?A=B:NEXT
  100 PROCcheck
  110 DATA 17,17,17,31,15,15,15,7,255
,255,255,255,127,59,102,119,204,204,2
04,204,136,102,255,136,0,0,0,0,0,0,0,
0,3,51,51,119,119,221,221,153,127,255
,255,255,255,238,255,255,204,238,119,
51,48,96,192,204,96,192,136,136,0,0,0
,0
  120 DATA 51,0,0,0,0,0,1,1,239,239,7
,22,30,31,63,127,132,224,240,212,192,
192,136,136,0,0,0,0,0,0,16,48,17,17,0
,0,0,0,0,68,0,204,119,119,119,119,51,
51,0,0,0,17,255,238,238,200,0,0,204,1
36,0,0,0,0
  130 DATA 0,0,0,0,0,0,0,0,51,51,51,5
1,17,102,255,17,255,255,255,255,239,2
05,102,238,136,136,136,143,15,15,15,1
4,96,48,17,17,0,0,0,0,51,119,238,204,
192,96,48,51,239,255,255,255,255,119,
255,255,12,204,204,238,238,187,187,15
3
  140 DATA 0,0,0,0,0,0,128,192,18,112
,240,178,48,48,17,17,127,127,14,134,1
35,143,207,239,204,0,0,0,0,0,8,8,0,0,
51,17,0,0,0,0,0,0,0,136,255,119,119,4
9,0,51,238,238,238,238,204,204,136,13
6,0,0,0,0,0,34
  150 DATA 115,115,115,245,246,246,24
6,96,200,128,128,128,0,0,0,0,49,16,16
,16,0,0,0,0,236,236,236,250,246,246,2
46,96,0,0,0,0,16,16,49,49,115,113,247
,247,255,255,254,236,236,232,254,254,
255,255,247,115,0,0,0,0,128,128,200,2
00
  160 DATA 247,247,247,245,115,49,16,
0,247,255,255,255,255,255,245,115,254
,255,255,255,255,255,250,236,254,254,
254,250,236,200,128,0
  170 DATA 96,246,246,246,228,228,246
,246,16,49,115,115,99,115,243,253,128
,200,236,236,108,236,252,251,96,246,2
46,246,114,114,246,246
  180 DATA 34,68,153,17,34,34,68,68,1
70,170,34,34,68,68,68,68,85,85,68,68,
34,34,34,34,68,34,153,136,68,68,34,34
,107,107,121,60,22,3,69,153,189,214,1
07,189,199,243,120,15,219,182,109,219
,62,252,225,15,109,109,233,227,134,12
,42,153
  190 DATA 153,69,3,22,60,121,107,107
,15,120,243,199,189,107,214,189,15,22
5,252,62,219,109,182,219,153,42,12,13
4,227,233,109,109
  200 DATA 68,68,34,34,17,153,68,34,6
8,68,68,68,34,34,170,170,34,34,34,34,
68,68,85,85,34,34,68,68,136,153,34,68
  210 FOR P=0 TO 2 STEP2:P%=&900:[OPT
 P:LDX#4:.loop LDY#31:.loop1 LDA(&70)
,Y:EOR(&72),Y:STA(&72),Y:DEY:TYA:BPL
loop1:INC&73:LDA&72:CLC:ADC#&40:STA&7
2:BCC Ok:INC&73:.Ok LDA&70:SEC:SBC#32
:STA&70:DEX:BNE loop:RTS:]NEXT
  220 FOR P=0 TO 2 STEP2:P%=&930:[OPT
 P:LDY#0:.loop2:LDA string,Y:JSR&FFEE
:INY:CPY#21:BNE loop2:LDA#10:STA&FE00
:LDA#32:STA&FE01:LDA#19:JSR&FFEE:LDA#
1:JSR&FFEE:LDA#0:JSR&FFEE:JSR&FFEE:JS
R&FFEE:JSR&FFEE
  230 LDA#19:JSR&FFEE:LDA#2:JSR&FFEE:
LDA#0:JSR&FFEE:JSR&FFEE:JSR&FFEE:JSR&
FFEE:LDA#19:JSR&FFEE:LDA#3:JSR&FFEE:L
DA#0:JSR&FFEE:JSR&FFEE:JSR&FFEE:JSR&F
FEE
  240 LDA#17:JSR&FFEE:LDA&77:JSR&FFEE
:LDA&75:AND#3:CMP#0:BEQ Vert:CMP#2:BE
Q Cross:CMP#1:BEQ Horiz:JMP Square
  250 .Vert JSR Vert1:JSR Exits:RTS
  260 .Vert1
  270 LDA#13:JSR&FFEE:LDA#10:JSR&FFEE
:JSR&FFEE:LDY#29:.loop4 LDX#6:.loop5
LDA&76:JSR&FFEE:DEX:BNE loop5:LDX#8:.
loop6 LDA#9:JSR&FFEE:DEX:BNE loop6:LD
X#6:.loop7 LDA&76:JSR&FFEE:DEX:BNE lo
op7:DEY:BNE loop4
  280 RTS
  290 .Cross JSR Vert1:LDA#31:JSR&FFE
E:LDA#0:JSR&FFEE:LDA#10:JSR&FFEE:LDY#
12:LDA#32:.loop8 LDX#20:.loop9 JSR&FF
EE:DEX:BNE loop9:DEY:BNE loop8:JSR Ex
its:RTS
  300 .Horiz LDA#13:JSR&FFEE:LDA#10:J
SR&FFEE:JSR&FFEE:LDY#8:LDA&76:.loop10
 LDX#20:.loop11 JSR&FFEE:DEX:BNE loop
11:DEY:BNE loop10
  310 LDY#12:.loop12 LDA#10:JSR&FFEE:
DEY:BNE loop12:LDY#9:LDA&76:.loop13 L
DX#20:.loop14 JSR&FFEE:DEX:BNE loop14
:DEY:BNE loop13:JSR Exits:RTS
  320 .Square
  330 LDA#13:JSR&FFEE:LDA#10:JSR&FFEE
:JSR&FFEE:LDX#20:LDA&76:.loop15 JSR&F
FEE:DEX:BNE loop15:LDY#27:.loop16 LDA
&76:JSR&FFEE:LDX#18:.loop17 LDA#9:JSR
&FFEE:DEX:BNE loop17:LDA&76:JSR&FFEE:
DEY:BNE loop16
  340 LDX#20:LDA&76:.loop18 JSR&FFEE:
DEX:BNE loop18:JSR Exits:RTS
  350.string :]:A$=CHR$22+CHR$5+CHR$9
+"KEYS"+STRING$(9,CHR$32)+"LIVES":$P%
=A$:P%=P%+LEN(A$):[OPT P
  360 .Exits LDA#17:JSR&FFEE:LDA&77:J
SR&FFEE:LDA#31:JSR&FFEE:LDA#6:JSR&FFE
E:LDA#2:JSR&FFEE:LDA&75:AND#128:CMP#1
28:BEQ E1:LDA#32:JMP J1:.E1 LDA&76:.J
1 LDX#8:.loop19 JSR&FFEE:DEX:BNE loop
19
  370 LDA#31:JSR&FFEE:LDA#6:JSR&FFEE:
LDA#30:JSR&FFEE:LDA&75:AND#16:CMP#16:
BEQ E2:LDA#32:JMP J2:.E2 LDA&76:.J2 L
DX#8:.loop20 JSR&FFEE:DEX:BNE loop20
```

```
  380 LDA#31:JSR&FFEE:LDA#0:JSR&FFEE:
LDA#10:JSR&FFEE:LDA&75:AND#64:CMP#64:
BEQ E3:LDA#32:JMP J3:.E3 LDA&76:.J3 L
DX#12:.loop21 JSR&FFEE:PHA:LDA#8:JSR&
FFEE:LDA#10:JSR&FFEE:PLA:DEX:BNE loop
21
  390 LDA#31:JSR&FFEE:LDA#19:JSR&FFEE
:LDA#10:JSR&FFEE:LDA&75:AND#32:CMP#32
:BEQ E4:LDA#32:JMP J4:.E4 LDA&76:.J4
LDX#12:.loop22 JSR&FFEE:PHA:LDA#8:JSR
&FFEE:LDA#10:JSR&FFEE:PLA:DEX:BNE loo
p22
  400 RTS
  410 ]NEXT
  420 DIM D%(70)
  430 FOR A=1 TO 70:READ D%(A):NEXT
  440 DATA 195,145,147,130,145,131,16
3,209,145,163,98,195,177,96,195,2,18,
145,131,50,115,67,177,96,66,3,130,145
,2,163,227,98,227,96,67,18,50,224,96,
96,96,99,96,112,112,194,179,66,35,98,
82,34,82,147,145,19,145,51,112,99
  450 DATA 211,19,145,146,147,147,147
,146,145,51
  460 DIM K%(70)
  470 PROCmusic
  480 PROCtitle
  490 E%=3
  500 FOR A=1 TO 70
  510 IF (D%(A) AND 3)=3 K%(A)=-1 ELS
E K%(A)=1
  520 NEXT
  530 L%=2:K%=0:LI%=5
  540 dead%=0:?&75=D%(L%):?&76=L% MOD
4+226:?&77=(L% DIV2)MOD3+1
  550 IF LI%=-1 PROCendgame:GOTO 490
  560 CALL&930
  570 IF K%(L%)=1 COLOUR3:PRINTTAB(10
,17);CHR$225
  580 COLOUR3:PRINTTAB(2,1);K%;TAB(14
,1);"* ";LI%;" *"
  590 DX%=20:DY%=34:IF (D%(L%) AND3)=
3 D%=1 ELSE D%=0
  600 IF E%=1 X%=18:Y%=52 ELSE IF E%=
2 X%=34:Y%=30:J%=1 ELSE IF E%=3 X%=2:
Y%=30:J%=0 ELSE X%=18:Y%=6
  610 PROCsprite(X%,Y%,&5660+J%*128)
  620 IF D% PROCsprite(DX%,DY%,&5760)
 ELSE DX%=50:PROCblock
  630 VDU28,19,0,(L% MOD3+1)*2;0;19,3
,0;0;
  640 *FX14,4
  650 PROCwitch
  660 IF K%=42 PROCsuccess:GOTO 490
  670 IF dead% PROCdead:GOTO 540
  680 IF X%=0 L%=L%-1:E%=2:GOTO 540
  690 IF X%=36 L%=L%+1:E%=3:GOTO 540
  700 IF Y%=4 L%=L%-10:E%=1:GOTO 540
  710 IF Y%=54 L%=L%+10:E%=4:GOTO 540
  720 IF D% PROCdemon
  730 IF dead% PROCdead:GOTO 540
  740 GOTO 650
  750 DEF PROCwitch
  760 MX%=X%:MY%=Y%:MJ%=J%
  770 IF INKEY(-82) THEN *FX210
  780 IF INKEY(-17) THEN *FX210,1
  790 IFINKEY(-98) PROCleft
  800 IFINKEY(-67) PROCright
  810 IFINKEY(-73) PROCup
  820 IFINKEY(-105) PROCdown
  830 IF INKEY(-90) PROCpause
  840 IF ABS(X%-DX%)<4 AND ABS(Y%-DY%
)<8 dead%=1
  850 ENDPROC
  860 DEF PROCsprite(x,y,p)
  870 s=&5800+x*8+y DIV2*&140
  880 ?&70=p MOD256:?&71=p DIV256:?&7
2=s MOD256:?&73=s DIV256:CALL&900
  890 ENDPROC
  900 DEF PROCdemon
  910 PROCsprite(DX%,DY%,&5760)
  920 IF DX%>X% DX%=DX%-1
  930 IF DX%<X% DX%=DX%+1
  940 IF DY%>Y% DY%=DY%-1
  950 IF DY%<Y% DY%=DY%+1
  960 IF ABS(X%-DX%)<4 AND ABS(Y%-DY%
)<8 dead%=1
  970 PROCsprite(DX%,DY%,&5760)
  980 ENDPROC
  990 DEF PROCcheck
 1000 FOR P=0 TO 2 STEP2:P%=&5500:[OP
T P
 1010 .right LDA#0:STA&78:LDA&72:CLC:
ADC#32:STA&72:BCC Ok5:INC&73:.Ok5 LDY
#0:LDA(&72),Y:CMP#0:BNE Nogo
 1020 LDX#3:.loop23 INC&73:LDA&72:CLC
:ADC#&40:STA&72:BCC Ok6:INC&73:.Ok6 L
DY#0:LDA(&72),Y:CMP#0:BNE Nogo:DEX:BN
E loop23
 1030 RTS
 1040 .left LDA#0:STA&78:LDA&72:SEC:S
BC#10:STA&72:BCS Ok7:DEC&73:.Ok7 LDY#
0:LDA(&72),Y:CMP#0:BNE Nogo
 1050 LDX#3:.loop24 INC&73:LDA&72:CLC
:ADC#&40:STA&72:BCC Ok8:INC&73:.Ok8 L
DA(&72),Y:CMP#0:BNE Nogo:DEX:BNE loop
24
 1060 RTS
 1070 .up LDY#0:STY&78:DEC&73:LDA&72:
SEC:SBC#&40:STA&72:BCS Ok9:DEC&73:.Ok
9 LDA(&72),Y:CMP#0:BNE Nogo
 1080 LDX#3:.loop25 LDA&72:CLC:ADC#8:
STA&72:BCC Ok10:INC&73:.Ok10 LDA(&72)
,Y:CMP#0:BNE Nogo:DEX:BNE loop25
 1090 RTS
 1100 .Nogo LDA#1:STA&78:RTS
 1110 .down LDY#0:STY&78:INC&73:INC&7
3:INC&73:INC&73:INC&73:LDA(&72),Y:BNE
 Nogo
 1120 LDX#3:.loop26 LDA&72:CLC:ADC#8:
STA&72:BCC Ok11:INC&73:.Ok11 LDA(&72)
,Y:BNE Nogo:DEX:BNE loop26
 1130 RTS
 1140 ]NEXT
 1150 ENDPROC
 1160 DEF PROCleft
 1170 s=&5800+X%*8+Y% DIV2*&140:?&72=
s MOD256:?&73=s DIV256
 1180 CALL left
 1190 X%=X%-2:J%=1:IF ?&78 dead%=1
 1200 IF dead%=1 AND X%>16 AND X%<21
AND Y%>26 AND Y%<36 dead%=0:K%=K%+1:P
RINTTAB(10,17);" ";TAB(2,1);K%:K%(L%)
=-1:SOUND 3,3,53,1
 1210 PROCsprite(MX%,MY%,&5660+MJ%*12
8)
 1220 PROCsprite(X%,Y%,&5660+J%*128)
 1230 ENDPROC
 1240 DEF PROCright
 1250 MX%=X%:MY%=Y%:MJ%=J%
 1260 s=&5800+X%*8+Y% DIV2*&140:?&72=
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

→

From Page 133

```
s MOD256:?&73=s DIV256
 1270 CALL right
 1280 X%=X%+2:J%=0:IF ?&78 dead%=1
 1290 IF dead%=1 AND X%>16 AND X%<21
AND Y%>26 AND Y%<36 dead%=0:K%=K%+1:P
RINTTAB(10,17);" ";TAB(2,1);K%:K%(L%)
=-1:SOUND 3,3,53,1
 1300 PROCsprite(MX%,MY%,&5660+MJ%*12
8):PROCsprite(X%,Y%,&5660+J%*128)
 1310 ENDPROC
 1320 DEF PROCup
 1330 MX%=X%:MY%=Y%:MJ%=J%
 1340 s=&5800+X%*8+Y% DIV2*&140:?&72=
s MOD256:?&73=s DIV256
 1350 CALL up
 1360 Y%=Y%-2:IF ?&78 dead%=1
 1370 IF dead%=1 AND X%>16 AND X%<21
AND Y%>26 AND Y%<36 dead%=0:K%=K%+1:P
RINTTAB(10,17);" ";TAB(2,1);K%:K%(L%)
=-1:SOUND 3,3,53,1
 1380 PROCsprite(MX%,MY%,&5660+MJ%*12
8):PROCsprite(X%,Y%,&5660+J%*128)
 1390 ENDPROC
 1400 DEF PROCdown
 1410 MX%=X%:MY%=Y%:MJ%=J%
 1420 s=&5800+X%*8+Y% DIV2*&140:?&72=
s MOD256:?&73=s DIV256
 1430 CALL down
 1440 Y%=Y%+2:IF ?&78 dead%=1
 1450 IF dead%=1 AND X%>16 AND X%<21
AND Y%>26 AND Y%<36 dead%=0:K%=K%+1:P
RINTTAB(10,17);" ";TAB(2,1);K%:K%(L%)
=-1:SOUND 3,3,53,1
 1460 PROCsprite(MX%,MY%,&5660+MJ%*12
8):PROCsprite(X%,Y%,&5660+J%*128)
 1470 ENDPROC
 1480 DEF PROCblock
 1490 TX%=(RND(10)+5)*2:TY%=(RND(14)+
7)*2
 1500 IF POINT(TX%*32,1023-TY%*16-4)
OR POINT(TX%*32+127,1023-TY%*16-4) OR
 POINT(TX%*32,1023-TY%*16-100) OR POI
NT(TX%*32+127,1023-TY%*16-100) GOTO 1
490
 1510 IF TX%>12 AND TX%<25 AND TY%>18
 AND TY%<43 GOTO 1490
 1520 PROCsprite(TX%,TY%,&57E0)
 1530 ENDPROC
 1540 DEF PROCendgame
 1550 VDU22,7:?&FE00=10:?&FE01=32
 1560 PRINT'''''''''':FOR A=1 TO 2:PR
INTCHR$141;CHR$129;TAB(14);"GAME OVER
":NEXT
 1570 FOR A=1 TO 8000:NEXT
 1580 CLS:PRINT'CHR$131;CHR$157:FOR A
=1 TO 2:PRINTCHR$131;CHR$157;CHR$129;
CHR$141;TAB(14);"WITCH HUNT":NEXT
 1590 PRINTCHR$131;CHR$157'CHR$131;CH
R$157;CHR$132;TAB(12);"By Stephen Gra
y"'CHR$131;CHR$157
 1600 PRINT''':FOR A=1 TO 2:PRINTCHR$
141;CHR$130;TAB(9);"LAST SCORE ... ";
K%;" KEYS":NEXT
 1610 PRINT''''':FOR A=1 TO 2:PRINTCH
R$141;CHR$134;TAB(10);"ANOTHER GO (Y/
N) ?":NEXT
 1620 *FX15
 1630 REPEAT A$=GET$:UNTIL A$="Y" OR
A$="y" OR A$="N" OR A$="n"
 1640 IF A$="N" OR A$="n" VDU22,7:END
 1650 ENDPROC
 1660 DEF PROCmusic
 1670 ?&220=&00:?&221=&54:?&89=0:N=&8
9:P=&5400:Pp=&84:?&80=1:?&81=0:?&82=1
:?&83=0:M=112
 1680 ENVELOPE1,1,0,0,0,1,1,1,90,-1,-
1,-1,90,45:ENVELOPE2,1,0,0,0,1,1,1,60
,-1,0,-1,60,45:ENVELOPE 3,1,8,8,-16,5
,5,5,127,-3,-3,-3,127,67
 1690 FOR PASS=0 TO 2 STEP 2
 1700 P%=&5480
 1710 [OPT PASS
 1720 LDA#&80:LDX#250:LDY#&FF:JSR&FFF
4:TXA:BEQ L:LDX N:LDA P,X:STA Pp:LDA
P+1,X:STA Pp+2:JMP No:.L RTS:.No LDX#
&80:LDY#0:LDA#7:JSR&FFF1:LDA Pp:CLC:A
DC#48:STA Pp:LDA#2:STA&80:STA&82:LDX#
&80:LDY#0:LDA#7:JSR&FFF1:LDA#1:STA&80
:STA&82
 1730 INC N:INC N:LDX N:LDA N:CMP#M:B
EQ Ne:RTS:.Ne LDA#0:STA N:RTS
 1740 ]
 1750 NEXT
 1760 FOR A=0 TO 110 STEP2:READ F,H:A
?P=F+20:A?(P+1)=H:NEXT
 1770 DATA 33,3,41,3,33,3,41,3,49,3,4
1,3,33,3,13,3,21,3,29,3,33,3,21,3,13,
3,21,3,13,3,13,3,21,3,29,3,33,3,41,3,
49,3,53,3,49,3,53,3,49,3,49,3,41,3,41
,3,33,12
 1780 DATA 41,3,41,3,41,3,49,3,53,3,4
9,3,41,6,49,3,49,3,49,3,53,3,61,3,53,
3,49,6,61,3,53,3,49,3,41,3,33,3,41,3,
49,3,53,3,49,3,49,3,41,3,41,3,33,12
 1790 ENDPROC
 1800 DEF PROCdead
 1810 *FX13,4
 1820 ?N=0:*FX15
 1830 LI%=LI%-1
 1840 SOUND 0,1,6,1
 1850 FOR A=1 TO 20
 1860 VDU19,0,A;0;:FOR B=1 TO 200:NEX
T,
 1870 ENDPROC
 1880 DEF PROCpause
 1890 *FX13,4
 1900 ?N=0:*FX15
 1910 REPEAT UNTIL INKEY(-106)
 1920 *FX14,4
 1930 ENDPROC
 1940 DEF PROCsuccess
 1950 *FX13,4
 1960 ?N=0:*FX15
 1970 VDU22,5:FOR A=1 TO 3:VDU19,A,0;
0;:NEXT
 1980 ?&FE00=10:?&FE01=32
 1990 FOR A=0 TO 36 STEP6:B=&5660+(&8
0*(A/6))MOD&200:PROCsprite(A,2,B):PRO
Csprite(A,52,B)
 2000 NEXT
 2010 FOR A=16 TO 48 STEP12:B=&5660+(
&80*((A-4)/12))MOD&200:PROCsprite(0,A
,B):PROCsprite(36,A,B):NEXT
 2020 MOVE 256,799:MOVE 1024,799:PLOT
 85,256,255:PLOT 85,1024,255
 2030 COLOUR1:COLOUR 131:PRINTTAB(5,9
);"WELL DONE!"
 2040 COLOUR2:PRINTTAB(5,13);"WITCH H
UNT"TAB(9,15);"IS"TAB(5,17);"FINISHED
 !"
 2050 COLOUR0:PRINTTAB(6,19);"ANOTHER
"TAB(5,21);"GO (Y/N) ?"
 2060 VDU20,19,0,6;0;19,3,0;0;
 2070 RESTORE 2090
 2080 FOR G=1 TO 22:READ F,H:SOUND 1,
1,F,H*4:SOUND 2,2,F+48,H*4:NEXT
 2090 DATA 33,1,41,1,49,1,53,2,33,3,5
3,1,49,1,53,1,61,2,41,3,41,1,49,1,53,
1,69,1,61,1,61,1,53,1,53,1,49,1,41,1,
49,1,33,5
 2100 REPEAT A$=GET$:UNTIL A$="Y" OR
A$="y" OR A$="N" OR A$="n"
 2110 IF A$="N" OR A$="n" VDU22,7:END
 2120 ENDPROC
 2130 DEF PROCtitle
 2140 VDU22,7:?&FE00=10:?&FE01=32:PRI
NT''':FOR A=1 TO 2:PRINTCHR$141;CHR$1
31;TAB(14);"WITCH HUNT":NEXT:PRINTCHR
$131;TAB(14);"**********"
 2150 PRINT''':FOR A=1 TO 2:PRINTCHR$
141;CHR$134;TAB(12);"By Stephen Gray"
:NEXT
 2160 PRINT''':FOR A=1 TO 2:PRINTCHR$
141;CHR$130;TAB(9);"Press SPACE to st
art":NEXT
 2170 REPEAT IF INKEY(-82) THEN *FX21
0
 2180 IF INKEY(-17) THEN *FX210,1
 2190 UNTIL INKEY(-99)
 2200 ENDPROC
```

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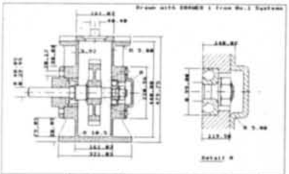

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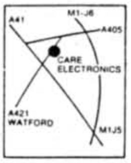

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From Page 72

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490 DEX
500 BPL loop1
510 .single
520 LDA char
530 .code
540 LDX #63
550 .loop2
560 CMP chars,X
570 BNE next
580 TXA
590 JSR store
600 CMP #13
610 BNE continue
620 LDA #0
630 BEQ set
640 .next
650 DEX
660 BPL loop2
670 .set
680 STA flag
690 RTS
700 .match
710 STX temp
720 LDA string+1,Y
730 LDX #12
740 .loop3
750 DEX
760 BMI single
770 CMP table,X
780 BNE loop3
790 TXA
800 ASL A
810 ASL A
820 ASL A
830 ASL A
840 CLC
850 ADC temp
860 ADC #64
870 INY
880 JSR store
890 BCC continue
900 .lower
910 CMP #65
920 BCC return
930 CMP #91
940 BCS return
950 ORA #32
960 PHA
970 LDA #1
980 JSR store
990 PLA
1000 .return
1010 RTS
1020 .store
1030 INC tpos
1040 LDX tpos
1050 STA compstr,X
1060 CLC
1070 RTS
1080 ]
1090 P%=chars+64
1100 [OPT pass
1110 .message
1120 TAX
1130 LDA #comptext MOD 256
1140 STA text
1150 LDA #comptext DIV 256
1160 STA text+1
1170 LDY #0
1180 TXA
1190 CMP (text),Y
1200 BCC within
1210 BEQ within
1220 BRK
1230 ]
1240 ?P%=46:P%=P%+1
1250 $P%="Bad message"
1260 P%=P%+LEN($P%)
1270 [OPT pass
1280 BRK
1290 .within
1300 TXA
1310 BEQ printout
1320 LDY #1
1330 .search
1340 LDA (text),Y
1350 PHA
1360 LDA text
1370 CLC
1380 ADC #1
1390 BCC clear
1400 INC text+1
1410 .clear
1420 STA text
1430 PLA
1440 CMP #13
1450 BNE search
1460 DEX
1470 BNE search
1480 .printout
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From Page 141

```
1490 LDY #0
1500 STY flag
1510 .nextchar
1520 INY
1530 LDA (text),Y
1540 CMP #64
1550 BCC notcode
1560 SBC #64
1570 PHA
1580 AND #15
1590 TAX
1600 LDA table,X
1610 JSR print
1620 PLA
1630 LSR A
1640 LSR A
1650 LSR A
1660 LSR A
1670 TAX
1680 LDA table,X
1690 BPL oldline
1700 .notcode
1710 TAX
1720 LDA chars,X
1730 BNE oldline
1740 JSR osnewl
1750 LDA #0
1760 .oldline
1770 CMP #1
1780 BNE nset
1790 STA flag
1800 LDA #0
1810 .nset
1820 CMP #13:BEQ out
1830 JSR print
1840 BPL nextchar
1850 .out RTS
1860 .print
1870 LDX flag
1880 BEQ lower2
1890 CMP #97
1900 BCC lower2
1910 CMP #123
1920 BCS lower2
1930 LDX #0
1940 STX flag
1950 AND #223
1960 .lower2
1970 JMP oswrch
1980 .comptext
 1990 ]
 2000 NEXT
 2010 RESTORE
 2020 FOR code=0 TO 37
 2030 READ chars?code:NEXT
 2040 FOR code=38 TO 63
 2050 chars?code=code+59:NEXT
 2060 $table=" etaoinshrdlugcy"
 2070 IF check=0 GOTO 2100
 2080 PROCcheck(compress,store+8,&30B
3,1)
 2090 PROCcheck(start,comptext-1,&5C7
2,2)
 2100 ENDPROC
 2110 REM ************************
 2120 DEFPROCcheck(S%,F%,C%,E%)
 2130 T%=0
 2140 FOR M%=S% TO F%:T%=T%+?M%:NEXT
 2150 IF T%<>C% PRINT"Error ";E%;" in
 PROCassemble"''"Please check and try
again":END
 2160 ENDPROC
 2170 REM ************************
 2180 DEFFNask
 2190 traphex=TRUE
 2200 CLS:FOR Y%=3 TO 4
```

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```
 2210 VDU 31,6,Y%,132,157,135,141
 2220 PRINT"BBC TEXT COMPRESSOR   ";C
HR$156
 2230 NEXT
 2240 INPUT'''"Store system and text
in memory at"'"&"addr$
 2250 start=EVAL("&"+addr$)
 2260 IF start<&B00 OR start>(HIMEM-&
200) OR (start>(PAGE-&200) AND start<
(!&2 AND &FFFF)+256) dummy=&error
 2270 traphex=FALSE
 2280 =start
 2290 REM *************************
 2300 DEFPROCcompress
 2310 address=comptext+1:original=2
 2320 number=0
 2330 REPEAT
 2340 READ text$:$string=text$
 2350 IF text$="*" GOTO2420
 2360 CALL compress
 2370 $address=$compstr
 2380 address=address+LEN($compstr)+1
 2390 IF address>HIMEM PRINT"Memory f
ull at"'text$:VDU 7:END
 2400 original=original+LEN(text$)+1
 2410 number=number+1
 2420 UNTIL text$="*" OR ?flag
 2430 IF ?flag PRINT "Illegal charact
er in string:"'text$:VDU 7:END
 2440 ?comptext=number-1
 2450 PRINT'"Text compressed to ";INT
(100*(address-comptext)/original);"%"
 2460 PRINT'"Now save decompression s
ystem"'"and compressed text using:"'
 2470 PRINT "*SAVE <filename> ";~star
t;" ";~address+1''
 2480 ENDPROC
 2490 REM *************************
 2500 IF ERR=28 AND traphex PRINT'"Il
legal entry"'"Please try again":Q=INK
EY(100):GOTO 60
 2510 IF ERR=17 PRINT''"You wish to e
scape (Y/N) ?";:key=GET AND &DF:IF ke
y=78 THEN 60
 2520 CLS:PRINT''':REPORT
 2530 PRINT" at line ";ERL
 2540 END
 2550 REM *************************
 2560 DATA 0,1,32,46,44,33,63,34,39
 2570 DATA 40,41,58,59,13,47,45,96
 2580 DATA 48,49,50,51,52,53,54,55
 2590 DATA 56,57,129,130,131,132,133
 2600 DATA 134,135,136,137,140,141
 2610 REM *************************
 2620 REM Enter text in data lines
 2630 REM after this point
 2640 REM *************************
 2650 DATA "This is just an example"
 2660 DATA "of a piece of text to be
compressed."
 2670 DATA "You should insert your ow
n text into"
 2680 DATA "data lines, and end the d
ata"
 2690 DATA "with an asterisk."
 2700 DATA "It is possible to use the
 hash#character in your text to start
 a new#line. This facility is useful
for a#long message where otherwise wo
rds#would be broken between lines."
 2710 DATA "Mode 7 teletext colour co
des (as#produced by the function keys
) are also#allowed, but only the basi
c colours and#double height codes."
 2720 DATA "*"
```

This listing is included in this month's cassette tape offer. See order form on Page 149.

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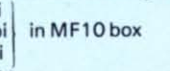

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Hike up the Fruit Worm's speed a spot

I WAS disappointed to find that Fruit Worm in the August issue suffered from very bad keyboard response.

The program uses the zero page locations &EC and &ED to check which keys are being pressed, but does not check these locations often enough.

I believe that checking the keyboard input buffer using the INKEY(0) function gives a much better response without slowing the game down.

The following alterations can be used to improve what is otherwise a very addictive program.

The occurrences of the following numbers:

```
183  194  200  225  232
```

should be replaced by:

```
80  08  58  90  47
```

respectively in the following lines:

```
130  180  190  200  210
220  3470  5030  5040  5050
 5060  5130  5150  5170
5220  5240  5260
```

Next, type in these two lines:

```
4980 LDA#129:LDX#0:LDY#0
4990 JSR&FFF4
```

and finally delete line 5010.

*For people wishing to keep their sanity and allow the neighbourhood to sleep the *FX210,1 command turns off the sound.* – **J.D. Keay, Keighley, W. Yorks.**

● We found the response fast enough as it was, but for those who didn't this certainly speeds it up.

* * *

MY edition of the August issue has got a smudge on line 5210 of Fruit Worm.

Can you tell me what it should read? – **S. J. Thomas, Cardigan, Dyfed.**

● We're sorry about the smudge in some copies. The correct line should read:

```
5210 LDA&70
```

Useful guide

CONGRATULATIONS to The Micro User *team for producing a section on new software and for its honest points system.*

This has helped me buy some of the most exciting games ever instead of wasting money on useless ones. – **Mark C. Davies, Virginia Water, Surrey.**

Easy mover

I WOULD like to use the keyboard to change the direction an object moves on screen. I do not wish to clear the screen every time the object moves. Also I don't want the object to move too slow or fast. Please can you help? – **Jonathan Broddle, Cranleigh, Surrey.**

● There are many ways of achieving movement. The following program shows a method which is probably the easiest.

Print a space on top of your old object and print the object in a new position.

Line 30 switches off the cursor and line 40 changes cursor keys so that they become Ascii keys 136 to 139.

Lines 50 to 80 are the main loop which checks for one of the cursor keys, calls PROCupdate if it is a cursor key and then prints a space over the old character and a character in the new position.

PROCupdate remembers the old *x* and *y* values and changes them by one in the appropriate direction. If this moves off the screen the values remain unchanged.

```
   10 oldx=9:oldy=15:x=9:y=
15
   20 MODE5
   30 VDU23;8202;0;0;0
   40 *FX4,1
   50 REPEAT
   60 key=INKEY(0):IFkey>13
5ANDkey<140PROCupdate
   70 PRINTTAB(oldx,oldy)"
"TAB(x,y)"*"
   80 UNTILFALSE
   90 DEFPROCupdate
  100 oldx=x:oldy=y
  110 IFkey=136THENx=x-1:IF
x<0x=0
  120 IFkey=137THENx=x+1:IF
x>19x=19
  130 IFkey=138THENy=y+1:IF
y>30y=30
  140 IFkey=139THENy=y-1:IF
y<0y=0
  150 ENDPROC
```

Win a tenner

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Writers of the three most interesting letters will each receive a £10 prize.*

Highlight hiccup

I TYPED out the Viewgen utility from the July edition of The Micro User, *on my Master with seeming success in that the driver was assembled producing a program which loads into View.*

It produces a hard copy of the codes, but whenever it encounters a highlight marker it prints a "this is not a language" error message.

Have I made a mistake or does the program not run on the Master?

I suspect it is incompatible because of the PROCBASIC1 statement, if so can I change this and how? – **John Cleverly, Basingstoke, Hampshire.**

● The program works on the Master. You must have typed it wrong, but we can't think what you could have done to create the error you mention. Can any of our readers?

Battery blast

I WISH to advise users of the Master against operating it with the top cover removed.

Some three weeks after I got my Master 128 the battery exploded for no apparent reason, spraying boiling hot battery acid against the underside of the top cover and into the battery nest.

I was only alerted to this by a strong smell of melting plastic and a burbling noise – easily confused with speaker noise.

Prompt action saved damage to the circuit board – the battery remained too hot to touch for 20 minutes.

It doesn't take much imagination to picture the consequences of this happening in a classroom while someone is using a lidless Master.

Acorn has done some strange things in it's short, but meteoric, career – attempted customer maiming must surely win some kind of award.

I repeat – do not use the computer without its top cover – **Robert Rancans, London, SW16.**

● Anyone who has not yet taken the advice previously printed in

→

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now colour the sun
1 or 3 ?

Windmill: *Word, number and colour recognition*

Angler: *Fun with angle estimation*

sleeping
sleping
I keep
on the ice.

Spelldroid: Learn to spell with our friendly robot

TORTOISE TRACK
3 + 1 =

Tortal: *Teach and test the rules of single addition*

PLUS:

Database: *A comprehensive database for the young learner.*

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Volume 2 of *The Micro User* Education Special contains nine full length programs written to the highest standards and each picked to combine educational worth with sheer enjoyment. The nine programs cover topics from early reading and simple sums to the rules of punctuation and angle estimation – and there's an excellent introductory database.

The magazine contains the complete listings of all the programs together with advice on how they can be adapted to cater for individual needs.

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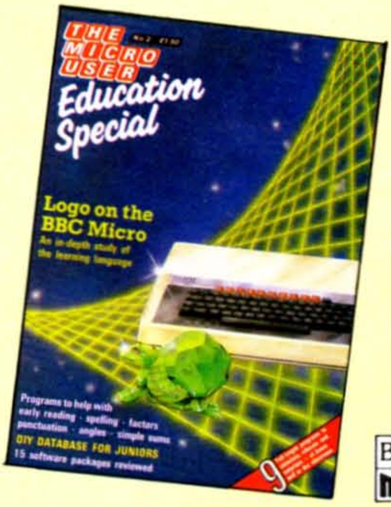
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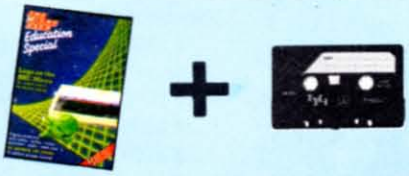

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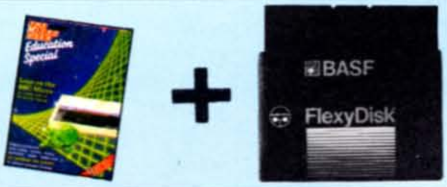
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To order turn to the form on Page 159

From Page 145

The Micro User to change the batteries should contact their dealer now. If any of our readers knows of Master owners who might not be aware of problems with early versions, would they please let them know.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Hanging printer

In response to a letter in the August issue of The Micro User *"Preventing the printer from hanging", how about the following, which is in Basic and will work even if you have a large buffer in action.* – **F. H. Greaves, Dibden Purlieu, Southampton.**

```
   10 REPEAT
   20 *FX21,3
   30 buff%=ADVAL(-4)
   40 VDU2,1,32,1,32,3
   50 IF ADVAL(-4)<buff% TH
EN VDU7:PRINT"Printer not o
n line"'"Please put on line
."'"Then press any key.":RE
PEAT UNTIL GET:VDU11,11,11:
PRINTSTRING$(120," "):VDU11
,11,11,11
   60 UNTIL ADVAL(-4)=buff%
```

Basic II ROM bugs

I MOVED on to the BBC from a Spectrum about seven months ago, and so don't know whether or not this bug I have found in the Basic II ROM has been mentioned before.

It concerns the use of the keyword READ. For instance, the following program:

```
   10 RESTORE 100
   20 REPEAT
   30 READ A
   40 PRINT A
   50 UNTIL A=0
   60 END
  100 DATA 1,2,3,4,5,6,7,8,
9,0
```

correctly prints out the values 1 to 9. However, if line 100 is edited to read for example:

```
  100 PRINT 1,2,3,4,5,6,7,8
,9,0
```

the program runs exactly as before. In fact, any Basic keyword may be placed before the data list, or even none at all, as in:

```
  100 1,2,3,4,5,6,7,8,9,0
```

making sure that there is a space after 100 and before 1.

I have not had the opportunity to try this out on a Basic I machine, but have tried it on several which run Basic II. I wonder if anyone else has noticed this? Also, does the bug exist in the Master's Basic? – **Iain Tatch, Chingford.**

- We tried this on Basic I, II and an Electron and found that a keyword or any other word was needed, but the 1 was lost. Does anyone know why?

The bug seems to be fixed on the Master.

Master options

SEVERAL errors concerning the Master's ROM and RAM options have been made in the Master Class Part Three article in the August 1986 issue of The Micro User. *Here are the correct facts:*

Firstly the maximum number of additional ROMs that can be fitted is nine, five in internal sockets and four in ROM cartridges.

Secondly moving link 19 east will enable IC37 to accept a 2764 – 8k, 27128 – 16k or 27256 – 32k – eprom.

A 27256 will appear as ROM numbers 6 and 7. A 2764 or 27128 will appear as ROM number 7, in which case ROM position 6 cannot be used.

Thirdly link 18 has a corresponding effect on IC41 and ROM numbers 4 and 5.

Finally IC27, ROM number 8, can accept either a 2764 or 27128.

The information above concerning 27256 eproms is taken from the Master Reference Manual Part 1 page F2.2, while that about 2764 and 27128 eproms has been verified on a standard Master 128.

The problem of some eproms catching on the cartridge slot can be avoided by using a different ROM cartridge.

The ARA2 from Advanced Computer Products completely encloses the eproms, hence avoiding the problem. – **N. P. Ackroyd, Oakwood, Derby.**

- Thanks for your comments. Your statements about eproms are correct, but I had to write my articles several months before Acorn released Reference Manual 1. – **Rory McCloy.**

£10 Prize letter

Karate Combat

AFTER seeing your Elite Cheat program a friend and I decided to write one for the Superior Software's Karate Combat.

We hope it will be of use to beginners and no-hopers alike. – **M. Gowers, Reading, Berks.**

```
   10REM KARATE COMBAT CHEA
T PROGRAM
   20REM TO BE RUN BEFORE M
AIN GAME
   30REM BY G.HOPE and M.GO
WERS
   40MODE7
   50VDU23;8202;0;0;0;
   60PRINT"               Ka
rate  Combat"''"       AUTHO
RS:M.GOWERS & G.HOPE 1986"
   70PRINTTAB(14,5);" Cheat
 Page";TAB(15,6);STRING$(10
,"=")
   80PRINTTAB(12,9);"Amount
 of energy"
   90T=28:REPEAT
  100IFINKEY(-58) T=T+1:IFT
>255 T=0
  110IFINKEY(-42) T=T-1:IFT
<0 T=255
  120IFINKEY(-1) D=D/2 ELSE
D=200
  130PRINTTAB(18,11);T
  140FORDE=1TOD:NEXT
  150UNTILINKEY(-74)
  160VDU7:FORDE=1TO500:NEXT
:*FX15,0
  170PRINTTAB(11,13);"Never
 ending energy"
  180N=&7E:REPEAT
  190IFINKEY(-69) N=&81
  200IFINKEY(-86) N=&7E
  210IFN=&7E PRINTTAB(18,15
);" NO" ELSEPRINTTAB(18,15)
;"YES"
  220UNTILINKEY(-74)
  230VDU7:FORDE=1TO500:NEXT
:*FX15,0
  240PRINTTAB(13,17);"Start
ing level"
  250S=1:REPEAT
  260IFINKEY(-58) S=S+1:IFS
>255 S=1
  270IFINKEY(-42) S=S-1:IFS
<1 S=255
  280IFINKEY(-1) D=D/2 ELSE
D=200
  290PRINTTAB(18,19);S
  300FORDE=1TOD:NEXT
  310UNTILINKEY(-74)
  320?&900=T:?&901=N:?&902=
S
  330*FX15,0
  340*COMBAT
```

£10 Prize letter

Assembler working for the experts

IN his article 6502 Machine Code Part 7 (August 1986 Micro User*) Mike Bibby stated: "The program works out the values of the labels on the first pass and then assembles the code, including these values, on the second".*

While sufficient for newcomers to machine code programming, this is not accurate enough for more experienced programmers.

On the first pass the assembler assembles all the code it can, but if it meets a forward jump or branch it inserts a dummy address.

Listing I is a modified version of Program IV on P55 with the FOR . . . NEXT loop replaced by I%=0 and I%=3.

Running the program prints the first pass (Figure I) and pressing any key gives the second pass (not shown). Listing II is the same but with two NOP instructions added at line 70, and Figure II shows the results of both passes.

It can be seen that in each case for a forward jump the dummy address is the address of its own opcode which would produce an infinite loop – &900 in Figure I and &902 in Figure II – while the actual address – &90A – is assembled correctly on the second pass.

Listing III replaces the jump with a branch instruction at line 80, with Figure III showing the dummy branch &FE for the first pass and the corrected branch &05 for the second.

Branches are calculated from the next opcode (&904) with &FE being –2, which points to the branch opcode which is again an infinite loop:

```
0902  03  04  05
  D0  FE  A9  07
```

This method was probably chosen so that if incomplete first pass code is run the program stops in the first infinite loop until Break is pressed. – **D. Symons, Birmingham.**

PS: There is a mistake in Figure I p55 – the 0909 in the last line should be 0908.

```
0900              OPTI%
0900 4C 00 09 JMP there
0903 A9 07    LDA #beep
0905 20 EE FF JSR OSWRCH
0908 60       .there RTS
```

Figure I

```
  0REM PROG IV
 10:
 20beep=7
 30OSWRCH=&FFEE
 40I%=1
 50P%=&900
 60[OPTI%
 80JMP there
 90LDA #beep
100JSR OSWRCH
110.there RTS
120]
130A=GET
140IFI%=3 END ELSE
  PRINT:I%=3:GOTO50
```

Listing I

```
0900              OPTI%
0900 EA           NOP
0901 EA           NOP
0902 4C 02 09 JMP there
0905 A9 07    LDA #beep
0907 20 EE FF JSR OSWRCH
090A 60       .there RTS

0900              OPTI%
0900 EA           NOP
0901 EA           NOP
0902 4C 0A 09 JMP there
0905 A9 07    LDA #beep
0907 20 EE FF JSR OSWRCH
090A 60       .there RTS
```

Figure II

```
  0REM PROG IV
 10:
 20beep=7
 30OSWRCH=&FFEE
 40I%=1
 50P%=&900
 60[OPTI%
 70NOP:NOP
 80JMP there
 90LDA #beep
100JSR OSWRCH
110.there RTS
120]
130A=GET
140IFI%=3 END ELSE
  PRINT:I%=3:GOTO50
```

Listing II

```
0900              OPTI%
0900 EA           NOP
0901 EA           NOP
0902 D0 FE    BNE there
0904 A9 07    LDA #beep
0906 20 EE FF JSR OSWRCH
0909 60       .there RTS

0900              OPTI%
0900 EA           NOP
0901 EA           NOP
0902 D0 05    BNE there
0904 A9 07    LDA #beep
0906 20 EE FF JSR OSWRCH
0909 60       .there RTS
```

Figure III

```
  0REM PROG IV
 10:
 20beep=7
 30OSWRCH=&FFEE
 40I%=1
 50P%=&900
 60[OPTI%
 70NOP:NOP
 80BNE there
 90LDA #beep
100JSR OSWRCH
110.there RTS
120]
130A=GET
140IFI%=3 END ELSE
  PRINT:I%=3:GOTO50
```

Listing III

Master 128 tips

I HOPE these tips are of interest to owners of the Master 128.

*Firstly in Rory McCloy's article about the new Master Turbo upgrade in the August issue an undocumented extension of the *DRIVE command was brought to light.*

*If you have 80 track drives the command *DRIVE 0 40 on the Master will set the drive to double step mode, thus enabling it to read 40 track discs without the need to switch the drive manually – if it is a switchable drive.*

If this command is placed as the first one of the !BOOT file on your old 40 track discs, such as your games discs, you can auto boot them without groping behind the disc drive for the switch.

*To return the drive to 80 track mode you will need to enter the command *DRIVE 0 80 from the keyboard.*

Attempts to place this in !BOOT files on 80 track discs failed to have the desired effect once the 40 track version had been activated.

Secondly users of the Master 128 should also remember that Control+Z+Break sets the system to Acorn DFS mode, while Control+A+Break sets the system to the ADFS mode. Neither of these alter the settings held in the CMOS RAM of the machine.

Finally the editor of the Master 128 is also a useful way of developing larger than normal !BOOT files, or for making changes to existing ones. To set the system up simply enter:

***EDIT !BOOT**

This enters the editor and loads in the !BOOT file.

*Once in you make the changes you want, then use the f3 Save File option to put the new one on to the disc. If you are designing a new !BOOT file start by entering *EDIT.* – **Mike McNamara, Dunstable, Beds.**

● Putting *DRIVE 0 40 or 80 in the !BOOT file will work provided that !BOOT is in track 0 – the one that is common to both formats and so will read whichever way the drive is set.

Providing that your drive is set to 80 tracks and you create a !BOOT file first you should have no problems using this method.

Printouts

WITH regard to Barry Woodward's letter concerning Fleet Street Editor in your June 1986 edition I'd like to point out that all our advertising and information leaflets for the program made it clear that 640 dot bit image mode is required for satisfactory printouts.

If Barry would like to get in touch with us directly we will do our best to assist. – **Pat Bitton, Marketing Manager, Mirrosoft.**

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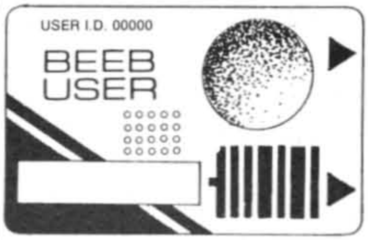

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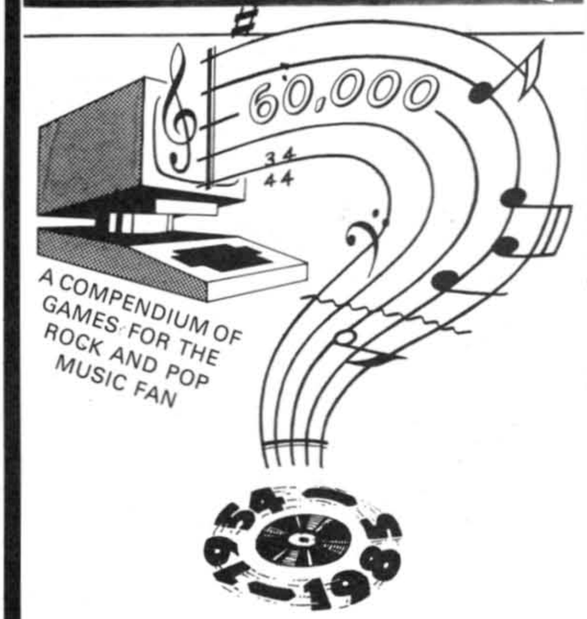
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Epson LX86 NLQ/120 cps NEW	236
Epson FX85 32 NLQ/160 cps 80 col	318
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Epson HI-80 Plotter	314
Epson EX800 50 LQ/300 cps (new)	425
Taxan KP810 NLQ/150 cps	220
Brother HR15XL Par 18 cps	338
Mannesmann Tally MT 80+	165
Mannesmann Tally MT 85 180 cps	278
Citizen 120D 25/120 cps	148
MONITORS	
Microvitec 1541 Med Res	230
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Philips BM 7222 Amber	75
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Taxan Supervision 111	315

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No. 1

- Draughts
- Fives
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- Molecule
- Reversi
- Code Breaker
- Patience
- Pontoon
- Pairs

For the BBC Micro and Electron

9 Classic card & board games

No. 2

- Backgammon
- Crib
- Squares
- Solitaire
- Tic Tac Toe
- Sliding Blocks
- Poker
- Sevens
- Higher & Lower

For the BBC Micro and Electron

BBC cassette can also be used on the Electron

B+ ✓
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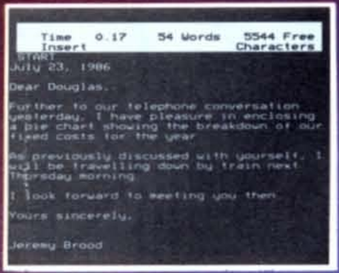


```
   Time   0.17    54 Words   5544 Free
   Insert                   Characters
 START
July 23, 1986

Dear Douglas.

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning

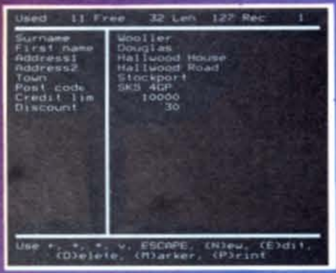
I look forward to meeting you then

Yours sincerely,

Jeremy Brood
```

WORD PROCESSOR

Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

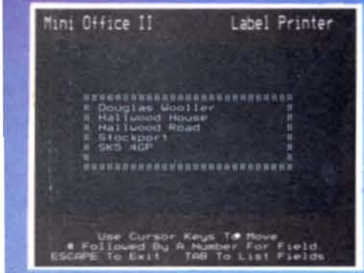


```
Used   11 Free   32 Len  127 Rec     1
Surname       Wooller
First name    Douglas
Address1      Hallwood House
Address2      Hallwood Road
Town          Stockport
Post code     SK5 4GP
Credit lim      10000
Discount           30

Use +, +, +, v, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE

Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



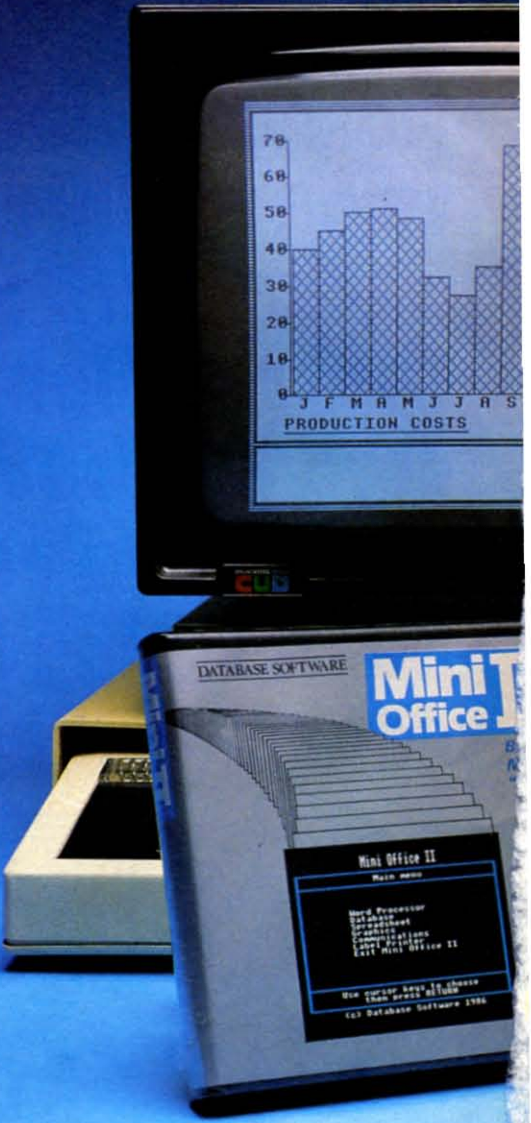
```
Mini Office II           Label Printer

      ################################
      # Douglas Wooller              #
      # Hallwood House               #
      # Hallwood Road                #
      # Stockport                    #
      # SK5 4GP                      #
      #                              #
      ################################

        Use Cursor Keys To Move
   # Followed By A Number For Field
 ESCAPE To Exit   TAB To List Fields
```

LABEL PRINTER

Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!



…and at a price

Mini Office II offers the most comprehensive, integrated suite of programs ever written for the BBC Micro – making it the most useful productivity tool yet devised.

A team of leading software authors were brought together to devote a total of 26 man years of programming to the development of Mini Office II. What they have produced is a package that sets new standards in home and business software.

The sample screenshots above illustrate just a few of the very wide range of features, many of which are usually restricted to software costing hundreds of pounds. Most are accessed by using cursor keys to move up and down a list of options and pressing Enter to select.

Is it that easy to use? Several leading reviewers have already sung its praises on this very point.

Yet possibly the best advertisement for Mini Office II is that it comes from the same stable that produced the original Mini Office package back in 1984.

That was so successful it was shortlisted in two major categories of the British Microcomputing Awards – the Oscars of the industry – and sold in excess of 100,000 units!

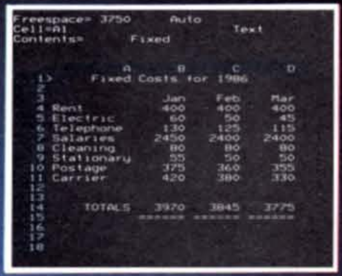
It was up to Mini Office II to take over where the first Mini Office left off, with 32 extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, very easy to follow manual.

This is the package thousands of BBC Micro owners have been waiting for – and at a price everyone can afford!

ONE package!

SPREADSHEET

Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!

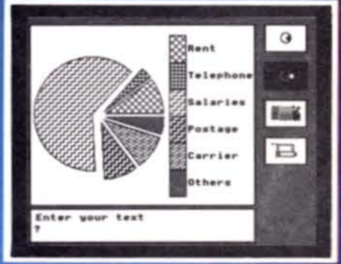


```
Freespace= 3750      Auto
Cell=A1                       Text
Contents=       Fixed

               A        B        C        D
  1>      Fixed Costs for 1986
  2
  3                   Jan      Feb      Mar
  4 Rent              400      400      400
  5 Electric           60       50       45
  6 Telephone         130      125      115
  7 Salaries         2450     2400     2400
  8 Cleaning           80       80       80
  9 Stationary         55       50       50
 10 Postage           375      360      355
 11 Carrier           420      380      330
 12
 13
 14      TOTALS      3970     3845     3775
 15                ====== ====== ======
 16
 17
 18
```

GRAPHICS

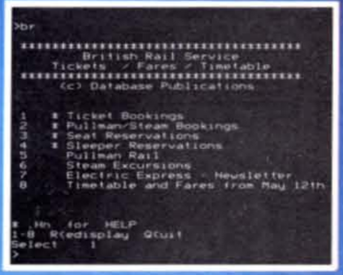
Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



```
Enter your text
?
```

COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



```
>br

****************************************
       British Rail Service
    Tickets  / Fares / Timetable
****************************************
     (c) Database Publications


1    * Ticket Bookings
2    * Pullman/Steam Bookings
3    * Seat Reservations
4    * Sleeper Reservations
5      Pullman Rail
6      Steam Excursions
7      Electric Express - Newsletter
8      Timetable and Fares from May 12th


* .Hn  for  HELP
1-8  R(edisplay  Q(uit
Select    1
>
```

that can't be matched!

Here's what some independent reviewers say about Mini Office II:

Menus throughout the program were abundant and well structured, allowing complex choices to be made with hardly a glance at the pocket-sized spiral-bound manual, and offering a wealth of user-defined functions . . . For the money it really is unbeatable. Dedicated word processors, spreadsheets and comms packages may offer some extra facilities, but some are so full of whistles and bells you may find yourself forever in the manual or even not using half of their power. What you get with Mini Office II is a valiant attempt to provide an all-embracing small business package at a down to earth price; it fulfills all its promises, and there's nothing cut-rate about the facilities it provides. – **Viewfax 258 (Prestel)**

BBC Model B and B+	
Cassette	*£14.95*
5¼″ disc	*£16.95*
3½″ disc	*£19.95*

The original Mini Office has been recognised as an astonishing bargain for anyone looking for a low-cost introduction to serious software. Now the four programs which made it up have been substantially enhanced and two new programs have been added. The result, Mini Office II, is more than just an introduction to serious software applications. It's good enough to fulfill the entire software needs of many a small business! . . . The range of features in each program is astonishing for a package of this cost . . . The spreadsheet is every bit as good as a program such as MasterCalc which costs more than the entire Mini Office II . . . This delightful little program [Graphics] allows you to produce professional looking charts to illustrate a set of figures. – **Amstrad Action**

The word processor is literally overflowing with excellent features . . . The database is very easy to use yet extremely powerful . . . The spreadsheet program is the next little gem . . . Having used Mini Office II for the past few days I cannot praise it too highly. – **Popular Computing Weekly**

DATABASE SOFTWARE

Order form on Page 159

Save keying in programs – and build up your

Here's a feast of games, utilities and educational programs!

MARCH: Astromines, space action. **Castle,** two player catapult battle. **Data Maker,** take the tedium out of entering Data. **Disc Search,** string search utility. **Command,** give your BBC and Epson printer the same character set. **Break Key,** disable Break. ***Plus Flex – a machine code game.***

APRIL: X15, sideways-scrolling spectacular. **Mornington Crescent,** fun on the London underground. **Calculator,** AMX mouse mathematics. **Dithering,** colour mixer. **Chatterbox,** speech chip procedures. ***Plus Rabbit Run – a machine code game.***

MAY: Stellar Rescue, arcade action. **Dominoes,** simulation. **Plot69,** fast Mode 2 plot routine. **Musical Events,** a music interrupt utility. **Pound and Hash,** an Epson printer routine. **Sheila,** let your micro run your slide show.

JUNE: Othello, simulation of the board game. **Activities,** word association. **Catnap,** arcade enjoyment. **Simon Quackers,** superb lightpen game. **Shape recognition,** teach your micro to identify. **Stripper,** a routine for removing line numbers. **Epson,** a type-setting utility. **Lprint,** simplifies string output. **Eval,** using the Basic command from machine code.

JULY: Fly, an arcade spectacular. **Draughts,** a superb version. **Compox,** 3D noughts and crosses. **Double Height,** large characters in Modes 0-6. **Clock,** alarm utility. **Compacter,** compress Mode 2. **Inside Basic,** basic routines in machine code. **RAMpage and RAMsave,** sideways RAM utilities. **Video,** graphics to music.

AUGUST: Harbour Command, protect a Cornish town. **Fruit Machine,** a gambler's favourite. **Mouse Organ,** AMX mouse music utility. **Flash,** alternative flashing colours. **String Formatter,** prevent end of line word splitting. **M/C Games,** random number and key detection routines.

SEPTEMBER: Ball Lightning*, tame the lightning. **Quarters,** game of skill. **6502 Games,** a simple arcade game. **Variable Lister,** track your variables. **Smiley Hunt,** Al's game. **Error handling,** the vital routines.

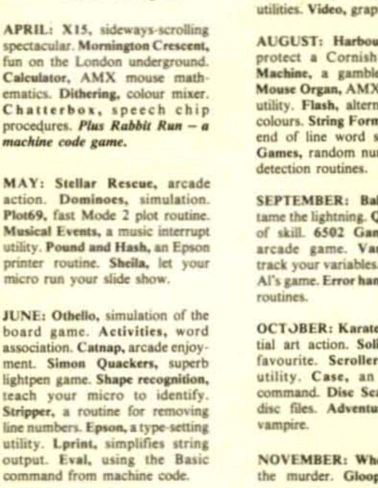
OCTOBER: Karate, superb martial art action. **Solitaire,** all-time favourite. **Scroller,** text scroll utility. **Case,** an ON PROC command. **Disc Scan,** search for disc files. **Adventure,** avoid the vampire.

NOVEMBER: Whodunnit, solve the murder. **Gloop Gulp,** zany arcade action. **Basic Analyser,** take the drudgery of debugging. **Wordwise F/keys,** get the most from your word processor. **Sideways,** sideways screen clear. **New Modes,** Modes 8, 9 and 10. **Disabler,** prevent star command clashes.

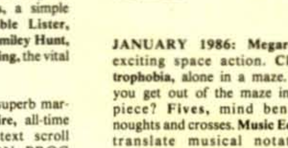
DECEMBER: Wizard's Castle*, recover a diamond from the necromancer's lair. **Squares,** 'join the dots' strategy. **McBase,** powerful database. **Alphabet Train,** early spelling. **Basic Analyser,** the vital cross reference tables. **Wordsquare Creator,** to create your own puzzles. **Dumper,** how your programs affect memory. **Subhunt,** the final listing. ***Plus the listings from Body Building and Adventures.***

JANUARY 1986: Megaroids, exciting space action. **Claustrophobia,** alone in a maze. Can you get out of the maze in one piece? **Fives,** mind bending noughts and crosses. **Music Editor,** translate musical notation. **Wordsquare Solver,** the program to help you solve them. **Find and replace,** find and replace any item of text in a Basic listing. **Discopy,** copy and/or rename files. **S-sound,** sounds into electronic effects. **Alice,** another baffling problem.

September bonus programs



Rockfall: Tired of the same old arcade games? Looking for new challenges? Well come diamond mining in Rockfall and you'll find unlimited action. Mastering the eight hazardous levels of the standard game is only a beginning – *You can go on to create your own, even more testing screens.* So as you increase in skill, Rockfall increases in difficulty.



Any Questions?: This ideal testing or revision aid allows you to create your own set of multiple choice questions. It incorporates full colour, complete analysis of results and hard copy options. Also included are two files of O-level mathematics and general studies questions.

FEBRUARY: Tipaka, can you escape the Logan King's castle in one piece? **USS Endeavour,** fast and exciting space invader action, and it's in machine code. **Ploy,** hours of enjoyment with this brain teasing strategy game. **Up-and-downloader,** an invaluable programming aid for loading and saving. **Fast Verify,** a superb utility for verifying saved disc files. **Disc Assembler,** assemble multi-part source files to disc. **Shift and Echo,** more electronic effects from the Body Building course. **8271,** using OSWORD to format a disc in a special way. **Elite Cheat,** the easy way to the top.

MARCH: Morris Miner, collect the keys and escape the mine before your time runs out in this levels and ladders spectacular. **Poster Puzzler,** a sliding block simulation to provide hours of fun for the whole family. **Quicksort,** a fast machine code sort routine that uses and teaches recursion. **Character Sets,** a program to create and display your own fonts. **8271,** four programs to complement the last article in the series. **Sound Sampler,** two programs from the Body Building course. **Eleusis,** another mind bending puzzle from Alice.

ONLY
£3.75 tape
£5.75 5¼" disc
£7.75 3" disc

APRIL: Ghouls of Azzod, can you escape from Azzod manor with its monsters, moving floorboards and venomous plants? **Mousetrap,** you'll need skill, strategy and a lot of luck in this very simple but infuriating chase game. **Character Sets,** outputting characters using Epsom compatible bit-imaging. **Special Fonts,** create interesting displays with this utility to give alternative fonts. **Notepad,** forget scraps of paper with this electronic jotter. **Hexer,** a hexadecimal loader for use in the machine code series. **Hyperspace,** another puzzler from Alice. **While Wend** and **While Wend Demo,** two listings from the mail pages.

MAY: Cavern Quest*, can you collect the diamonds before your oxygen runs out, avoiding the falling boulders as you go? **4-Site,** a mindbending 3-dimensional adaptation of noughts and crosses needing foresight. **Catalog II,** disc operations achieved quickly with a single key press. **Taming the Tube,** turning the 6502 second processor on and off by software. **Character Sets,** creating slim characters for use in Modes 2 and 5. **Alice,** another intriguing puzzle from our adventurer.

JUNE: Pendragon*, alone in a sugar factory, can you keep the evil yellow perils away from the sugar cubes, while positioning the four diamonds? **Spacebase,** as commander of a solitary spacebase you must defend Earth from the invading hoarde of aliens. **Rainbow,** whether doodling or creating works of art, this lightpen graphics utility will keep you happy for hours.

JULY: Royal Wedding, celebrate the most exciting royal event of the decade with this superb sliding block puzzle. **Dual Catalog,** feel restricted with the Acorn DFS maximum of 31 files? This utility to provide 56 on one side of a disc will solve your problems. **Viewgen,** what you see is what you get with this printer driver generator for View. ***PLUS digitised picture of Andrew and Sarah (disc only).***

AUGUST: Fruit Worm, can you survive the dangers of the deadly garden? **Upper,** force all your input into upper case. **Inkjet,** a printer test and two screen dumps for the ink jet printer. **Safer,** prevent accidentally overwritten files. **Hash,** a suite of programs illustrating searching techniques. **Geiger,** the software for the Body Building course.

SEPTEMBER: Pear Picker, avoid Plastered Patrick in your attempts to become a professional fuit picker. **Basic Events,** a versatile routine to control events from Basic. **Learner,** teach your word processor to remember those key sentences. **View Preview,** a useful program to preview pages of View files, complete with highlights. **VDU19,** programs to demonstrate the illusion of animation. ***BONUS PROGRAMS: Rockfall and Any Questions (mathematics and general studies).***

OCTOBER: Witch Hunt, can you help Olive the witch in her search for the 42 keys of Transportal? **Coloured Lights,** an educational program to explain the GCOL effects. **Mode 7 Dumps,** screen dumps for Epson compatible or Olivetti Inkjet printers. **Text Compressor,** a clever utility to get long messages into short memory. **Auto Run,** a powerful routine to star run Basic programs. **Weather Vane,** the program to complement the Body Building wind direction project. ***BONUS PROGRAMS: Quasimodo's Quest and Any Questions? (Music and Computer Studies).***

** Not Master compatible.*

B+ ✓
M ✓

OWN Micro User tape and disc library!

QUASIMODO'S QUEST

Your bonus game for October

Two more Any Questions? files

The 'Any Questions?' program offered with the September disc and tape has created a lot of interest among teachers and parents. This month we have two additional files of questions and answers – computer studies and music – prepared by qualified teachers.

The program analyses the results, displays exactly how pupils answered individual questions and there's a printout and save options for both questions and results.

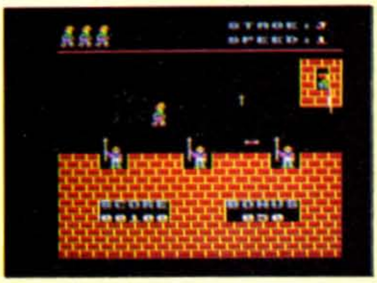
NOW'S your chance to play a brilliant version of one of the classic arcade games – in this extra game that comes with the October disc and tape.

Can you help Quasimodo rescue Esmerelda from the terrible tower and escape in one piece?

Too long to be included in the magazine as a type-in listing, this superb program uses machine code routines and colourful graphics to bring you all the thrills from the original – including rocks, arrows, swinging ropes, battlements and spear-lunging guards.

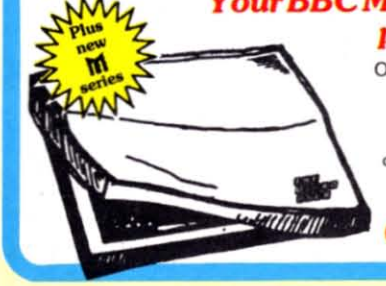
One of its many features is the facility to select from four levels of difficulty and to enter the game at any screen for practice purposes.

If you enjoy fast action and fun, this is one treat you can't afford to miss!



*Quasimodo's Quest and the 'Any Questions?' files on computer studies and music are in addition to the six programs contained in **The Micro User's** tape and disc for October.*

Your BBC Micro needs protecting!



Our luxury dust cover is made of soft pliable water-resistant transparent vingyl, bound with strong cotton and decorated with the *Micro User* logo in black.

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Keep your copies neat and complete

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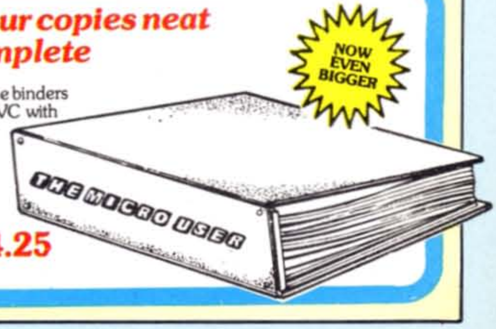

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DATABASE SOFTWARE
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BBC B & B+

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Save upto £10!

It's the most exciting, full colour flight simulator ever written for the home computer – and it uses every ounce of the micro's power to give the utmost realism to recreating the most spectacular aeronautical displays that have thrilled crowds at air shows for the last 21 years. The program comes with a detailed flight handbook that will soon help you take YOUR place alongside the ace pilots of the Red Arrows!

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5¼" disc £1.95
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If you already have a subscription which does not expire for several months you can re-order early to benefit from this exceptional offer.

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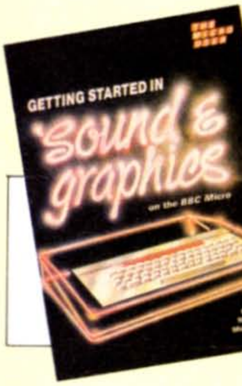
Save up to 60% on these classic books

Mike Bibby
Getting started in BBC Basic on the BBC Micro & Electron

Based on the highly praised series for beginners in *The Micro User*, 'Getting started in BBC Basic' takes the reader through the fundamentals of writing programs.

Its hands-on approach has been specifically designed to teach the absolute novice not only the formal rules of Basic but also that elusive quality – good programming style.

By working through its many examples, the reader will gain a clear insight into structured programming and will quickly acquire the ability to use structured techniques in creating his own programs.



'Getting started in Sound & Graphics' shows you how to harness the power of your micro to create dazzling displays and superb sound.

In this compilation of their highly praised series of articles in *The Micro User*, Michael Noels, Paul Jones and Nigel Peters explore the BBC Micro's outstanding sound and graphics capabilities.

Assuming only a rudimentary knowledge of Basic, the authors thoroughly explain all the programming methods involved, ranging from the simplest to the most complex.

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THE MICRO USER

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Commence with .... issue

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3" disc	£65	£75	*2008*	☐

Commence with .... (state month)

Renewals

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5¼" disc 80T	£50	£60	*2111*	☐
3" disc	£65	£75	*2112*	☐

Classic Card and Board Games

B+ ✓ M ✗

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Both books £13.90	*2475*	☐

UK only

Mini Office II

B+ ✓ M ✗

BBC 'B' cassette £14.95•	*2368*	☐
5¼" disc 40T £16.95•	*2369*	☐
5¼" disc 80T £16.95•	*2370*	☐
3" disc £19.95•	*2371*	☐

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>>>

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	1985					
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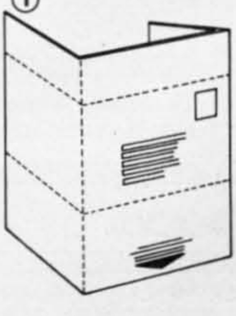

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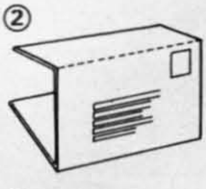

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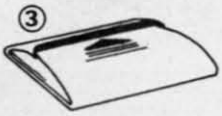

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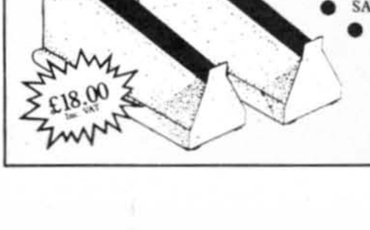

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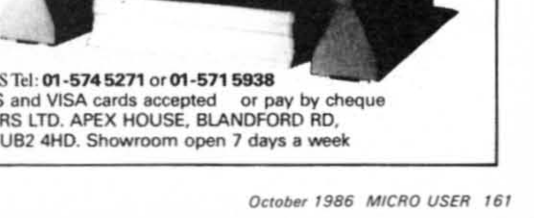

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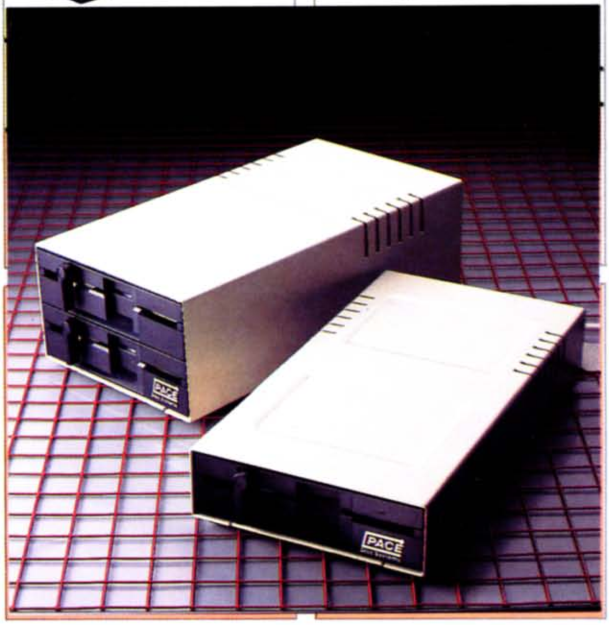

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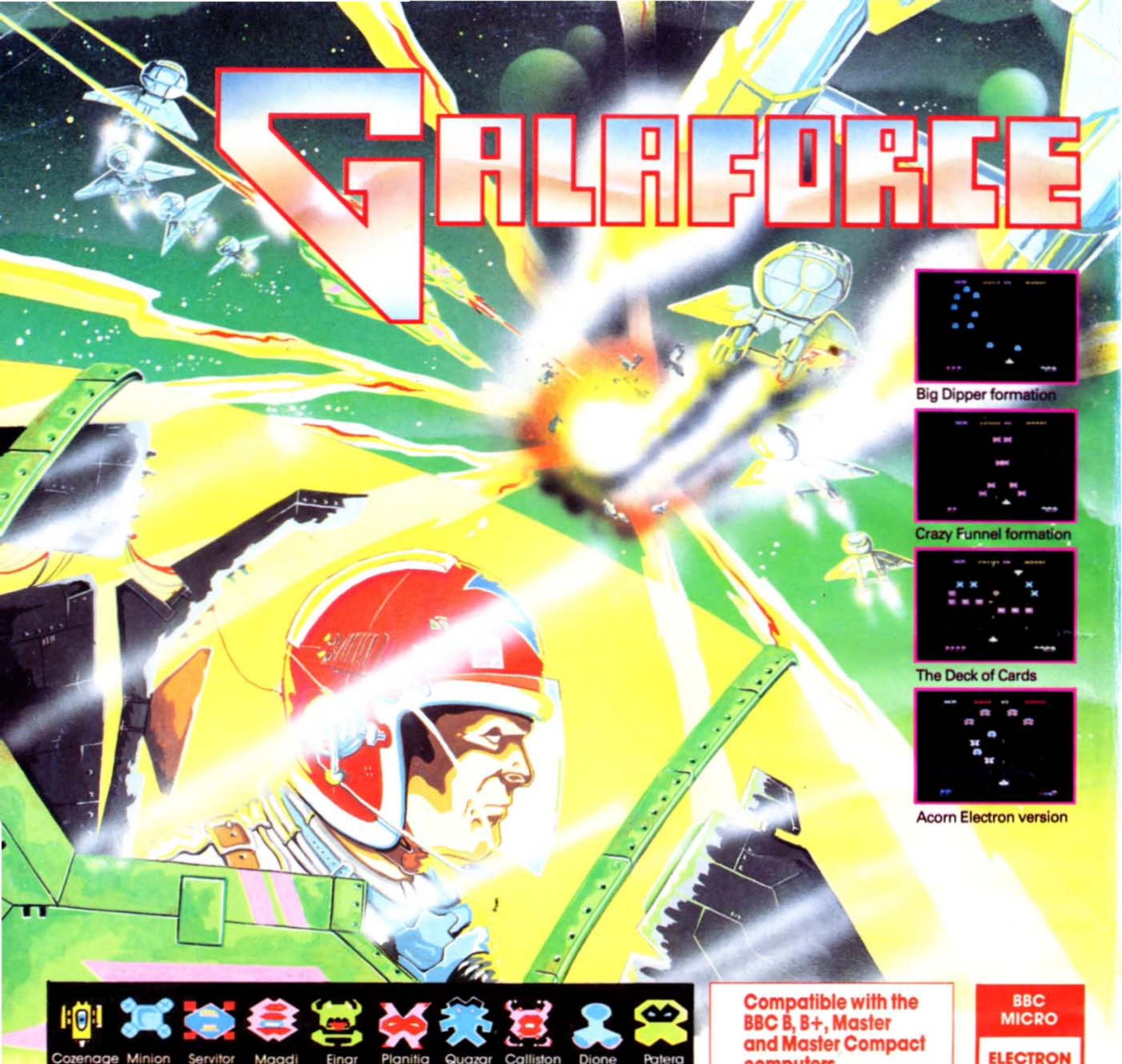

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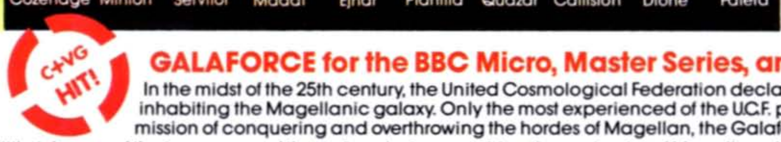

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